

COAL AGE

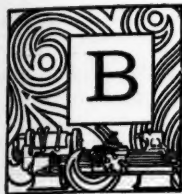
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An Occupational Disease

By R. DAWSON HALL



BY MANY a man is not considered a good executive unless he exudes seriousness, sobriety and even gloom. The man who would fill the ideal of the multitude must always be hurried and worried. The chief executive himself is also apt to think that because he has the distinction of control conferred on him, he is bound to exhibit a greater persistence in labors and a more ardent devotion to his duties than any of his subordinates.

As a result he breaks down in a few years. He loses his poise and develops *executivitis*—an occupational disease in which the stomach ceases to function, sleep is denied and the nerves give way. When, after a few months, you enter his office and spend a few minutes in his presence, you are convinced that his capable secretary or stenographer would be more able than he to fill his office. He has entirely lost his patience and sense of proportion.

This disease is not so common among men whose duties require the exercise of both mind and body as it is among desk executives who are moreover troubled by the fact that the work they are regulating is being performed or neglected by persons beyond the range of their vision and often beyond their immediate inquiry.

Most men newly appointed to executive positions assume and feel an overburdening sense of responsibility and an overmastering desire for intense activity. They feel that they are called upon to do something—they know not what—but whatever it is, to do it immediately. Yet perhaps what is needed more than anything else is just to fall back easily and restfully till the newness of the work loses some of its effect upon the nerves.

The first duty of every executive is to avoid worry and fatigue, for these are merely diseases of the mind which prevent its proper functioning. To acquire the right poise, all the duties that can be laid upon others should be disposed of in that way. One can nearly always find others in the organization who can perform any and all of the offices to be filled with a large degree of acceptability. They may even function in many ways better than the executive himself.

The thinking powers of the average brainworker are so cluttered with his labors that he cannot survey his work with any serenity. To some extent it is the work of the chief executive to do that for him, and if that executive is himself harassed by work and worry how can he visualize another man's difficulties? He has too much on his mind to visualize even his own.

Successful executives are neither self-conscious nor worrying. They are usually easy-going men. Their conclusions are reached and their actions performed without excitement or heat. They are not paid high salaries for large personal accomplishment or for mental distress, for the best men of this class do little and suffer less. They are paid to secure results from others, and such results cannot be obtained by those who worry crabbedly over the difficulties confronting them.

Too much has been written about the long hours, unflagging energy and minute information of great executives. Many have been led astray by such mendacious records and tried to make 100 yards in 5 seconds. It isn't in the range of human possibilities. It is not safe to crowd any man too hard, executive or worker, certainly not to a degree that will prevent either of them coming up smiling on every occasion, for it is the smile that wins.

Operating a Coal-Stripping Plant in Ohio

Stripping coal and loading the fuel into cars is not a novel or new proposition, but the details of this work often vary in the different coal fields of the country. The practice followed in the crop strippings in Ohio is here described. The overburden is handled by shovel entirely, and some suggestions are made for stripping by this method.

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THE amount and cost of production of coal from a stripping operation depend largely on the plant layout. There are two systems of loading coal—loading directly into standard-gage cars or by a tippie for the preparation of the coal. With the former system the layout is comparatively simple and consists of a standard-gage track laid directly into the open pit. This track is kept up to the loading shovel. On this layout a passing switch should be kept as near the loading shovel as practical, as it permits a dinkey to shift cars from the siding to the shovel with little loss of time to the loading crew. But if there is sufficient coal uncovered ahead of the loading shovel, a track of sufficient length to hold empties for a few days run may be laid, the cars being placed in the night or on overtime

two men in from four to five minutes when the hopper has sufficient capacity to hold the coal from a full train. The easiest and quickest method of dumping such cars is by means of a pipe or bar, the usual length being about 5 ft. This lever is placed against a strip nailed to the dumping platform of the tippie and is caught under the bed of the car as the engine pulls the train ahead. This dumps the car, and the brakeman with a helper can right the car again and release the chains on the next car without stopping the train.

On a coal-stripping plant the stripping shovel controls the output, since it is possible to load out more coal with the loading shovel than can be stripped in the same length of time. The amount of coal that can be uncovered by the

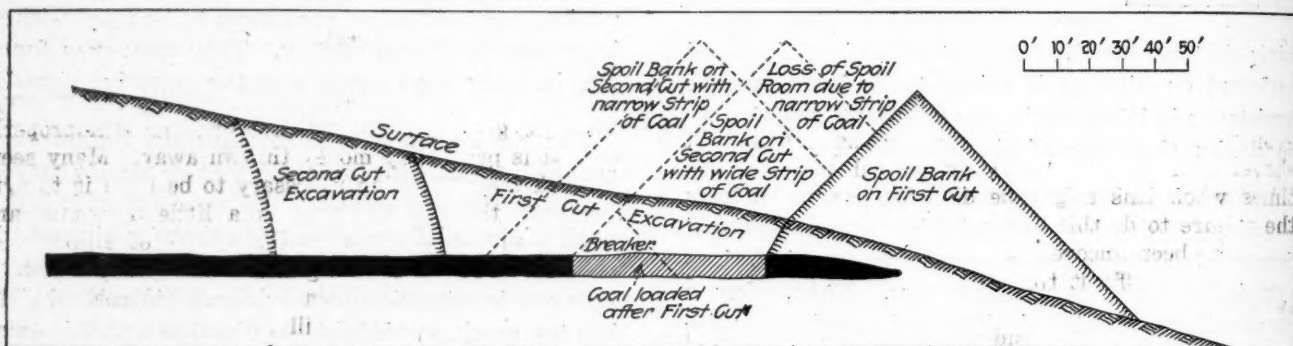


FIG. 1. THE RELATION OF SPOIL BANKS TO COAL REMOVED

Loss of spoil room caused by leaving a narrow strip of coal after each cut

by the switching crew. These cars can then be pulled into place as the loads are removed, thereby preventing any loss of time on the part of the loading shovel.

Where a tippie and contractors' equipment are used, the layout is more difficult to plan, requiring a thorough survey and study of the property before the location is chosen. The tippie must be placed so as to have the proper height and yet make possible the building up of a haulage track for side-dump cars. These cars should dump into a hopper with a capacity of at least 50 tons the hopper discharging onto the picking table. The level of the dinky track should be at least 50 ft. above the level of the standard-gage railroad track under the tippie, in order to gain hopper room, pitch for the screens and height for the installation of a crusher. This requirement often makes the dinky track layout difficult and expensive, but such an arrangement is essential to cheap production. The main haulage track ought to enter the track at the tippie on an easy grade.

It is important that all grades on the haulage track be kept under 4 per cent., preferably under 2 per cent. With easy grades it is possible for a 14-ton dinkey to handle a train of 15 4-yd. side-dump cars easily and expeditiously. Such a train of cars can be dumped by

stripping shovel depends on the thickness and nature of the overburden. The average width of the first cut is about 110 ft., and this cut usually can be dug without blasting. The average thickness of overburden is about 10 ft. on the crop side of the cut and about 25 ft. on the "high wall" side. The amount of dirt necessary to be moved per ton of coal uncovered on the first cut averages about 3 cu.yd. This is naturally the cheapest stripping. In order to conserve spoil room the stripping shovel must be kept as near the spoil bank as possible. Spoil room is the limiting factor in the stripping of coal. It is possible to blast and dig any depth of overburden, but it is not always possible to dispose of the dirt without hauling. This method is out of the question.

In the loading of the cars with coal there should be a strip of coal at least 25 ft. wide left next to the "high wall." It is more desirable to leave a strip 40 ft. wide. On this coal the haulage track is placed. A wide strip of coal makes it possible to shoot the overburden of the second cut without covering the haulage track.

On the second cut it is usually necessary to haul the coal past the stripping shovel. This requires more care in the operation of the stripping shovel; also in the blasting and haulage. When a width of coal of 40

ft. is left, the operation on the second cut is made less expensive and a great saving of spoil room is made possible. The haulage track is kept on the edge of the coal and the stripping shovel is kept as close to this track as possible, to allow clearance for the dinkeys past the shovel. The haulage track is then thrown to the desired width for the loading shovel to operate next to the spoil bank. With the haulage track so far from the stripping bank it is possible to do much more effective shooting without the danger of delays and the expense caused by the covering of the track. Operating the stripping shovel so far away from the spoil bank makes it necessary to dig at a greater angle with the line of the cut, and this makes more of a swing for the stripping machine. But the saving in spoil room, more satisfactory shooting and less trackwork justify the loss of time due to the greater working angle of the shovel. Where the conservation of spoil room is not so essential, a strip of coal 25 ft. wide will serve very well, although the expense of track maintenance is greater and more skill is needed in shooting the bank because of the danger of covering the track.

The disposal of the spoil is one of the most interesting and most vital points in coal stripping, while to the casual observer it is seemingly of little importance. The amount of overburden it is possible to dig depends largely on the amount of spoil which can be taken care of; as stated before, the placing of the shovel in the cut greatly affects the amount of dirt that can be spoiled without loss of coal. The width of the cut, therefore, is governed by the spoil room available, height of the bank and swell of spoil. The apex of the spoil bank should be kept opposite the middle of the shovel (directly opposite) or behind it. There are times when this might be difficult to accomplish, but the failure to do this has lost hundreds of tons of coal that have been uncovered.

The most difficult time to keep the spoil behind the shovel is on a curve, when the cut is on the outside and the spoil bank on the inside of the curve. The average observer fails to comprehend the increase in volume due to an increase in radius of 100 ft. even in curves of large radius. The volume of bank is increased and the dirt on the coal due to rolling lumps of dirt and rocks is largely eliminated by the use of the "double spoil bank." This bank, Fig. 1, is formed by building a small bank with a low bucket; it acts as a "breaker" for all rolling material from the top of the main bank, which is often 75 ft. high.

In stripping it is often economical and advantageous to make a "boxcut" through a saddle or low place in a

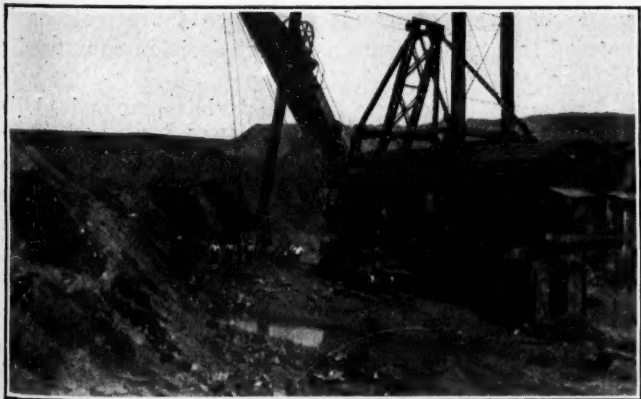


FIG. 2. SHOVEL IN CUT ABOUT COMPLETED

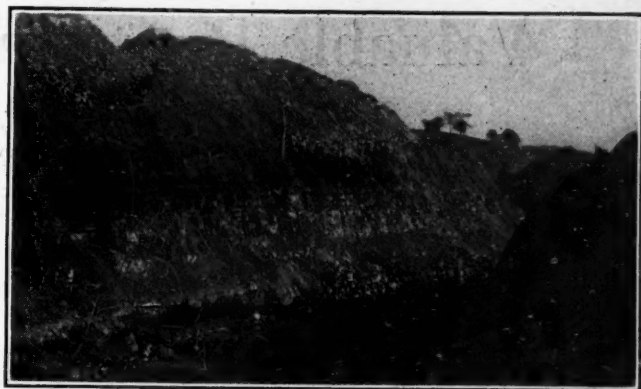


FIG. 3. CUT COMPLETED AND SHOVEL REMOVED

hill; while the only difficulty encountered is in the disposal of the dirt, it is sometimes hard to solve, especially where it is impossible to haul the dirt out. Figs. 2 and 3 show a "boxcut" 500 ft. long which was made at Apex, Ohio. The deepest overburden was 45 ft., for a distance of 300 ft. the cut was over 40 ft., and the shallowest cutting was 15 ft. The width of the cut was 81 ft. at the base and about 90 ft. at the top; the width of the cut was necessary to give clearance for the shovel. None of the dirt was hauled, but some of it was double cast. The second cast was made with a Marion "Model 36" caterpillar shovel. Fig. 2 shows the shovel where the cut is almost completed and Fig. 3 shows the finished cut.

The drilling and shooting of the overburden, if properly done, greatly facilitates the work; but if improperly done, it is practically money thrown away. Many seem to think the only thing necessary to be done is to drill a hole in the ground, pour in a little dynamite and powder, and satisfactory results will be obtained. But to do successful shooting it is necessary to have the holes drilled to within 1 ft. of the coal, and no damage is done if the drill touches the coal. These holes are drilled on about 25-ft. centers and 25 ft. back from the face. They should then be "sprung," and it might require 15 or more sticks of dynamite to do this, depending on the charge required. Usually 10 to 25 kegs of powder is sufficient to shoot the bank under ordinary conditions. Holes should not be loaded above the collar of the hole and should be well tamped. With good shooting, repair costs are materially lowered and the yardage moved considerably increased.

Stability of Methane

Mayer and Altmayer investigated the stability of methane and found the following percentages were stable in the presence of hydrogen:

Temperature, deg. C.	250	450	550	750	850
CH ₄ , per cent.	98.79	76.80	46.69	6.08	1.59

The reaction is represented by the expression $\text{CH}_4 = \text{C} + 2\text{H}_2$. At 850 deg. C. and atmospheric pressure 1.59 per cent. of methane is in equilibrium with hydrogen whose partial pressure is then 0.9841 atmospheres. As the partial pressure of the hydrogen decreases the equilibrium pressure of methane decreases also. The partial pressure of hydrogen in the furnace is small and the temperature much higher than 850 deg. C., therefore it is evident that only a very small percentage of methane can exist in equilibrium in a boiler furnace.—*Bureau of Mines Bulletin No. 135.*

Valuable Pyrite in Illinois Coal Beds*

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SYNOPSIS—*More than a million tons of pyrite, readily available for commerce, is found in the coal excavated every year by United States' mines. Of this Illinois could furnish 200,000 tons. Native sulphur should not be used where pyritic sulphur is equally effective. Article defines the various types of pyrite, their modes of occurrence, and shows in what beds and sections these types may be most generally found.*

MUCH interest has recently been shown in the pyrite occurring in Illinois coal, and special investigations have been made into the matter during the period of our participation in the war. The investigations carried on by the geological surveys of the various states, in coöperation with the Bureau of Mines, had their origin in a desire to find near the market a source of raw material for the manufacture of sulphuric acid in a quantity adequate to supply the anticipated demand.

The purposes of the investigation were more than fulfilled, to the extent that a possible supply of pyrite of more than one million tons annually was found readily available, the recovery of which would entail an almost negligible financial outlay on the part of the coal operators. A much greater amount was found to be available if mechanical means were installed for its separation, but this would necessitate a somewhat greater financial outlay. It would, however, result in the production of cleaner and more marketable coal.

Inasmuch as the need for the pyrite was not as great as had been anticipated, much of the benefit that was expected from the taking of the inventory will probably not be realized. Since this is the case, other considerations, only incidental to the main effort of finding pyrite supplies, become of relatively greater importance and deserve some attention.

For instance, the conservation of our national resources seems to call for the recovery of at least the best of our pyrite supply; and, again, the successful recovery of clean coal in Illinois depends considerably upon the recognition by the engineer of the variation in the form and in the manner of occurrence of the pyrite itself. The present discussion is concerned with these two considerations arising out of the pyrite inventory, which considerations at the beginning of the inquiry were of relatively minor importance.

If the mines of Illinois saved all the pyrite that is picked out of the coal at the face and also concentrated the pyrite that is found in the washery refuse, most of which is now lost, about 200,000 tons of raw pyrite could be recovered annually. This crude material, including the mill concentrates, would probably average

more than 75 per cent. pyrite having a sulphur content in excess of 45 per cent. Of the 25 per cent. waste probably more than half would be coal.

The milling and concentrating of the material would produce nearly double the amount stated above. Looking into the future, it will without question be necessary to work poorer and poorer grades of coal containing increasing amounts of pyrite, so that the available supply will increase rather than decrease. It is certainly reasonable to inquire whether this large amount of material, which can be manufactured into a material of great economic importance in our industrial life, should be wasted. If the failure to use the pyrite does not involve a permanent economic loss, it certainly suggests that such a loss is resulting from the present practice; and this possibility certainly merits investigation.

The possibility that the present practices are not desirable seems to involve at least two considerations. In the first place coal brasses must be recovered as the coal is being mined, for otherwise they will be either immediately buried in the gob of the old workings or thrown on the refuse heap at the shaft mouth where they will speedily oxidize. Accordingly, if the present practice is judged wasteful, new practice should be instituted at once to forestall further waste. Secondly, the use of native sulphur instead of pyrite for the manufacture of most of the sulphuric acid seems to involve the unnecessary expenditure of an extremely pure substance of which the supply is probably limited and which accordingly should be conserved only for necessary uses.

PYRITE PROBLEM ONE OF MANY ANGLES

Conditions justifying the use of native sulphur in war time do not obtain during peace, and it is a question whether this material should be sacrificed to the ordinary processes of trade. The pyrite problem has many ramifications, and a decision as to the correct national policy as regards coal brasses can be reached only after a further investigation has been made, which should study the sulphur reserves, the method of manufacture of sulphuric acid and the adaptability of the coal pyrite to manufacturing processes. The continual waste of pyrite demands that such investigations be carried to a point where a correct decision can speedily be reached.

The pyrite inventory in Illinois has emphasized the possibility of waste in present methods of pyrite recovery. It is also the first systematic study of the relative character and occurrence of pyrite in the various coal beds and individual mines. The survey did not include mines in all the districts, but for such districts as were included the observations furnish a basis of estimating the comparative amount of pyrite present and its relative ease of removal. Such information carefully collected over the entire Illinois field and made generally available would, it is believed, be useful as a basis of judging the character of a coal and in esti-

*The pyrite inventory in Illinois was conducted as one of the activities of the Illinois Coal Mining Investigations under a coöperative agreement between the State Geological Survey, Engineering Experiment Station, University of Illinois, and the U. S. Bureau of Mines.

matings the results that might be expected from different methods of preparation between the face and the railroad car.

The large assemblage of chemical data available concerning Illinois coal has put selection as regards relative heating value on a definite basis and, accordingly, variation in the quantity and character of the ash has become a matter of much importance. Most of the chemical data is based upon samples from the working face and in consequence these samples are almost invariably favorable so far as ash is concerned; for in the collection of the sample, impurities with a thickness of $\frac{1}{4}$ to $\frac{3}{8}$ in. or more are supposed to be removed.

The possibility of removal of impurities varies considerably under working conditions in different mines, and this is as true of pyrite as of the other impurities. In fact, if any distinction is to be made it is even more true. Accordingly, since the presence or absence of pyrite in a coal commonly is the basis for a purchaser's judgment as to the quantity and fusibility of ash in a coal, and since there is such a wide variation in the possibilities of its removal at the mine because of the various ways in which it occurs, definite information concerning the character of the pyrite and of its mode of occurrence in the different coals and in the different districts is certainly desirable. In the following paragraphs the character of the different forms of coal pyrite in Illinois coals and their manner of occurrence are briefly summarized.

FORMS OF PYRITE IN ILLINOIS COAL

Pyrite has been observed to have the following habits of occurrence: As brassy, massive, metallic-appearing mineral without apparent crystalline structure or form; as a crystalline mineral; as a brown or gray mineral without metallic luster or apparent crystalline character, this form being commonly laminated; and as impregnations in a very fine state and probably crystalline. The material occurs in the following common forms: As balls and lenses of a well defined shape and easily separable from the surrounding coal (see Fig. 1); as balls and lenses with the outer parts more or less ramifying into the surrounding coal and hence not easily separated from it (Fig. 2); as a fine leaf mineral in finely divided state lying along innumerable joint cracks in isolated patches of the coal (Fig. 3); as typical vein filling, especially in "horsebacks" (Fig. 5); as replacement of limestone, forming "niggerheads" in the roof shale, and in other limestone masses found associated with the coal; as impregnations of mother coal and of the clay filling of horsebacks (Fig. 6); as balls in the floor clay (Fig. 9); as plates or sheets commonly found in the partings between benches (Fig. 7); as facings in joint cracks, commonly very thin plates; and as rosettes in the laminations of the black fissile shales found above some of the coals.

The habit of occurrence of the pyrite seems to bear relation to the form. Pyrite in balls and lenses easily separated from the coal is apparently nearly always of the brassy, massive variety. The lenses and balls of indefinite boundary are commonly the gray, stony variety; this variety, at least, seems always to have an indefinite outline. The plate and sheet pyrite is variable in its habit, but pyrite of metallic appearance seems to be the most common variety. Facings are composed

of the bright pyrite. Vein fillings, the nodules in the fireclay, the rosettes in the roof slate and probably the impregnations of the clay fillings of horsebacks and of mother coal are all of a crystalline nature. Pyrite which replaces limestone takes on the form and texture of the original rock.

The ease with which pyrite is separated from coal at the face, the tippie or the washery depends largely upon the form of occurrence. As between the stony, crystalline and massive bright varieties there is practically no distinction so far as relative ease of recovery is concerned. The most easily separable pyrite is that occurring as balls and lenses of the brassy variety. It is plainly seen and its outline clearly defined, so that it is usually broken out by the miner at the face. There is little excuse for material of this kind ever appearing at the surface, unless it is present in unusually large quantities.

The pyrite occurring in the niggerheads and in limestone lenses or masses in the coal or near the boundary of the coal and the roof rock are also readily discarded. Next in relative ease of removal is the plate or sheet pyrite, provided the plates are of sufficient thickness to withstand the shattering effect of mining. If $\frac{1}{4}$ in. or more thick, the plates can usually be removed without difficulty from the coal in pieces, sometimes more than a foot wide. As the seam commonly parts at the pyrite band the material can usually be removed rather easily. Small pieces, however, commonly remain in the coal. If the plates or sheets are thin the proportion that is recoverable is small, since it is commonly so badly shattered in mining that removal by the miner is practically impossible. Such pyrite as this could be largely removed by washing the finer sizes of coal.

The removal of the brown, or gray, banded pyrite (see Fig. 4) in the mine is attended by more or less difficulty. It is not quite as readily seen as the bright variety, for not uncommonly it is rather dark colored by reason of the presence of a large quantity of what appears to be carbonaceous matter. Then also its outlines are indefinite. To remove this variety of pyrite much coal must, in general, be wasted if the entire mass of the lense is to be recovered. Coals having this form of pyrite in large quantity are almost sure to have a rather high pyrite content as shipped, unless all the coal is washed. If the larger sizes of coal were hand-picked at the tippie, large amounts of this material would probably be effectively removed. Pyrite present as facings is practically impossible of removal by any method of hand-picking except where, as in some rare localities, the facings become so numerous as to become practically a mass.

In some of the better Illinois coals pyrite occurs only as facings or as leaf pyrite (see Fig. 3). The removal of some of this impurity can be accomplished by crushing and washing the finer sizes, but it is probable that the actual amount of pyrite that could be thus removed would be negligible and would only in small degree affect the selling value of the coal.

Masses of leaf pyrite are commonly not discarded; although the mass may have a bright appearance, the actual amount of pyrite present is small. This is indicated by the fact that such a mass of coal filled with particles of leaf pyrite weighs but little more than pure coal. Furthermore, such pyrite is difficult to sep-

arate by washing, the small flakes of mineral remaining suspended and floating off with the coal. The problem of separating such pyrite from coal is yet to be solved.

The vein pyrite coal in Illinois (Fig. 5) rarely exceeds $\frac{1}{2}$ in. in thickness. Its occurrence is practically restricted to the horseback fissures such as are found to be especially numerous in No. 5 bed. The coal adjacent to such fissures is commonly well impregnated with pyrite in finely divided state so that the entire mass is very hard. It is the common practice to entirely discard the mass of coal attached to the sulphur "spar," as it is called, for it is usually thoroughly impregnated with pyrite. The miner receives extra pay for the removal of this material so that impurity of this sort does not commonly reach the top, except where the "spars" are thin.

Clay veins also are commonly rich in a finely divided pyrite that is disseminated throughout their mass (see Fig. 6) and reaches out into the adjacent coal. This pyrite with the attached coal is discarded just as the pyrite and coal in sulphur "spars" is thrown away. In many mines the removal of the horsebacks is a cause of considerable waste, and in some instances serious consideration could well be given to the problem of its elimination in, at least, a large degree.

The impregnation of mother coal by pyrite gives a very hard black material with the general appearance of mother coal but with a slight golden tinge. The material is very hard. The substance is commonly called "blackjack" by the miners, though it is possible that all the "blackjack" of miners is not pyritized mother coal. The material is nearly as difficult to cut as the gray or brassy pyrite, and where it lies in relatively large masses is readily discarded. Smaller masses, however, especially if imbedded in large masses of coal, are less easily removed. "Blackjack" commonly sticks rather tightly to the surrounding coal and the removal of pieces less than a foot in length and an inch or two thick, except as they occur along partings, does not seem to be common practice.

The sulphur balls found in the floor clay and the pyrite rosettes found in the roof shale do not commonly get into the coal as shipped. They are rather interesting occurrences but of no special importance commercially, except that clays with these sulphur concretions are not adapted for burning.

PYRITE IN THE VARIOUS COALS

The distribution of pyrite of the various varieties in the coal beds of the state is a matter of some interest. It is doubtful whether any of the varieties are restricted to any one bed, but certain occurrences seem to be typical of individual beds. This is true to such an extent that the manner of occurrence of pyrite can be taken as one of the criteria for identification of beds.

In the four more important commercial coals in Illinois, No. 2, No. 5, No. 6 and No. 7, pyrite is present in characteristic form. But the widely spread pyrite in No. 6 coal varies somewhat in different districts. Without an intimate knowledge of all the operations in the state it is impossible to make any generalizations in regard to the occurrence of pyrite to which exception cannot be taken, but it is believed that the following statements are based upon a sufficient number of obser-

vations to make them generally applicable and to form a basis for more extended investigation. The character of the pyrite present in the four coals mentioned will be described in the order given.

Pyrite in No. 2 (La Salle) coal, mined at La Salle, Spring Valley and southward as far as Bloomington, Roanoke, and in one mine at Peoria, seems to occur characteristically as isolated bright brassy nodules (see Fig. 1), commonly found in the upper half of the bed. By the miners these are called "sulphur" balls. Their common size is 3 to 4 in. across and 1 to $1\frac{1}{2}$ in. thick. Nodules exceeding a foot in thickness and 18 in. to 2 ft. across are found, but are rare. These sulphur balls generally comprise less than 0.5 per cent. of the total mass of the coal, but there is considerable variation in the amount present in different regions. They are usually readily removed from the coal at the face.

I am not aware that pyrite occurs in this form in the No. 2 coal at Murphysboro, in which area the sulphur content of the coal is very low, but in the northern part of the state, except possibly in the Grundy County field, such "sulphur" balls are quite characteristic of this bed. Other forms of pyrite are not conspicuous.

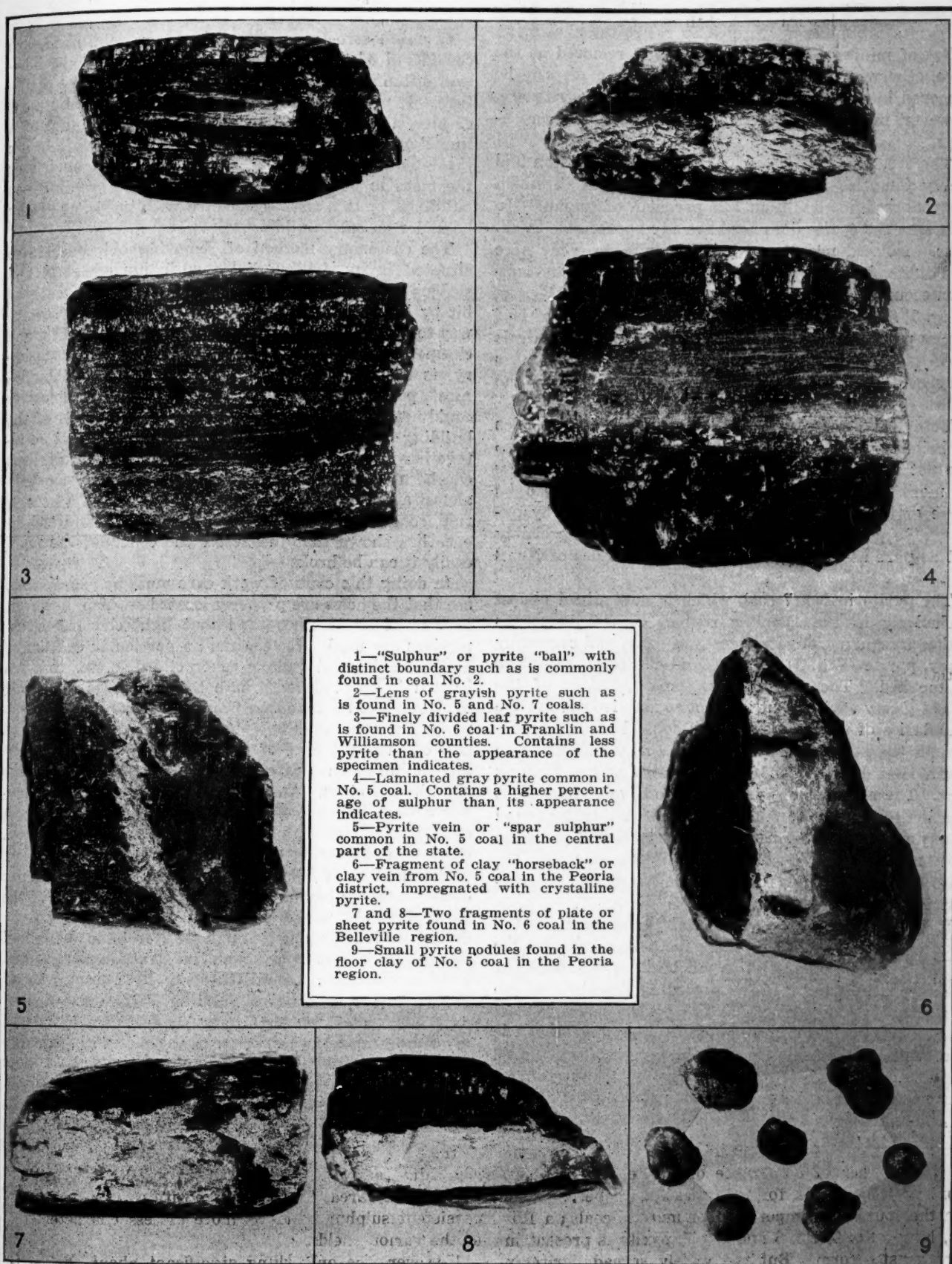
PYRITE CHARACTERISTIC OF PEORIA AND FULTON COUNTIES

Several varieties of pyrite seem to be characteristic of the next higher coal, No. 5 (Springfield or Harrisburg) coal. The two most conspicuous forms are the gray or brown laminated pyrite and the crystalline pyrite found in horsebacks. The gray or brown, stony and laminated pyrite (Fig. 4) are quite characteristic of the coal in many mines in the Peoria and Fulton County region and they have been observed in this coal as far east as Bloomington. Such pyrite does not seem to be quite as common in the Springfield region, though it is doubtless present. It has been observed as far south as Lincoln in Logan County.

The crystalline pyrite or "spar sulphur" (Figs. 5 and 6) is generally found in the mines in the central part of the state. In addition to these two varieties of pyrite, there also seems to be present in this coal in central Illinois a greater proportion of "blackjack" or mother coal impregnated with pyrite, than is found in other coals. But the amount differs greatly in different mines and in different districts even for this coal. None of these forms of pyrite are found to be especially characteristic of No. 5 coal in Saline County.

Sheets and plates of pyrite are characteristic of the No. 6 (Herrin) coal. From Du Quoin northward, at least to Centralia, and west to the Mississippi valley the coal in nearly all the mines is interbedded with pyrite in sheet or plate form (Fig. 7). It is commonly found in the partings between benches. As the coal is somewhat differently subdivided into benches in different parts of the area, the varying positions of the rather persistent sulphur bands is more or less characteristic of the various fields.

However, the only thing significant about the variation in the manner of occurrence seems to be that in parts of the area the sulphur partings are few and each relatively thin, whereas in other parts of the district the partings are numerous and each rather thick, that is $\frac{1}{4}$ to $\frac{1}{2}$ in. or more in thickness. There is a persistent sheet of pyrite found over large areas in this coal. This



Some of the Forms of Pyrite Occurring in Illinois Coal

The conservation of our national resources demands that the best of the country's pyrite supply be recovered. Furthermore, the successful output of clean coal in Illinois depends in great measure upon the engineer recognizing the many forms and the manner of occurrence of the pyrite itself

occurs about 4 in. above the blue band. If the sheets of pyrite are sufficiently thick to resist the shattering effect of mining they are rather easily removed at the face, otherwise they are broken up and can scarcely be removed by the miner. Such fragments of pyrite are, however, rather readily removed by washing the screenings.

The No. 6 bed of Franklin, Williamson, Jackson and Perry Counties includes a considerable area in which the coal contains less than 1.25 per cent. of sulphur. In this area the pyrite does not have any appreciable thickness. Isolated nodules of bright pyrite do occur here and there, but they are not common. The most common occurrence of pyrite is as leaf pyrite or as facings (Fig. 3). As has been stated the actual amount of leaf pyrite present may appear to be large when it really is small, for the particles being thin and of slight mass they evidence themselves more to the eye than to the scales.

Both No. 5 and No. 6 coal contain occasional nodules of bright pyrite in the upper part of the bed. These are not uncommonly 6 to 8 in. in thickness and a foot or more across, and in many instances appear to be more or less complete replacement of limestone by pyrite. They are not as clean and bright and probably not as pure as the pyrite found in the nodules of No. 2 coal.

The pyrite in No. 7 coal, which is now mined almost exclusively in the Danville region, occurs mostly as rather irregular elongated lenses of gray, and commonly stony, pyrite (Fig. 2). It is found at various positions in the bed. The pyrite is in some instances of the bright glossy variety, but it is not so massive nor are the boundaries of the nodules so well defined as in the nodules in the other coals. The lenses may extend 10 to 15 ft. laterally and be 3 to 4 in. thick at the thickest part. These masses of pyrite seem to have no persistent relation to any of the partings in the coal, being found at any position of the bed, and the separation from the coal is not as ready or as clean as is the case with the plate or sheet sulphur found in the No. 6 coal of some districts.

It is believed that the solution of the problem of furnishing clean coal to the public rests to a considerable extent upon an appreciation of the various ways in which pyrite occurs. If the preceding descriptions are accurate, it is apparent that the pyrite in No. 5 coal cannot be satisfactorily removed by the same methods that will successfully remove the pyrite from No. 6 coal. Furthermore, if the recovery of coal brasses ever becomes a matter of interest to the nation, some distinction should be made as regards the availability of the pyrite under the different conditions of its occurrence. It is probably true that there is sufficient variation in the character of the pyrite to warrant selection as to source, some coals possibly producing more acceptable material than others.

The numerous uncertainties expressed during the discussion is an indication of the need of further investigation before all the facts are assembled.

THE AVERAGE weight of a cubic foot of anthracite, bituminous coal and lignite in the solid is 97, 84 and 78 lb. respectively, according to L. S. Marks. The specific gravities of each of these fuels in the order given are also noted as 1.4 to 1.8, 1.2 to 1.5 and 1.1 to 1.4.

Breaking Up Concrete

Concrete structures, either plain or reinforced, are considered of the most permanent nature. It is, however, often necessary to remove or destroy such a structure. It may be an old concrete wall, bridge abutment or pier, a foundation under a building, the lining of a tunnel or an engine bed. Many times these objects are inside buildings and adjacent to valuable machinery, or the mass to be removed may be in close proximity to buildings, or to a street congested with traffic, or it may be under an office building.

The customary method of removing old concrete so situated is by drilling holes with jumper steel and sledges by hand and then breaking off the the material bit by bit with wedges. This is a slow and expensive way to handle work of this kind. The best, quickest and cheapest method to remove old concrete, brick or masonry, is by blasting with explosives. At first thought, most people would immediately say that explosives could not be used, as they would crack the walls of the building above or damage nearby machinery and be altogether too dangerous. As a matter of fact, explosives can be used with great economy of time and money in almost all cases and with absolute safety. As a general rule, concrete is easily cracked by blasting, and experience has shown that the better the concrete, the more easily it can be broken.

In doing this class of work care must be exercised to see that the holes are properly located—which, however, is true of all blasting—and that light charges of explosives are used. It requires no particular caution or ability to blast old walls of concrete, brick, etc., that are located in open places, where there is little likelihood of damage to surrounding property. But it is in cases where the structures to be removed are located close to and often are a part of valuable property, machinery and buildings that care and a nice sense of judgment must be exercised. An explosive of relatively slow heaving action, like ammonia 30 to 40 per cent. strength dynamite, is best adapted for such work rather than a quick and shattering explosive.

The drilling of holes is best accomplished by the use of self-rotating hammer drills, but when the size of the work does not warrant such equipment holes can be drilled by hand, using jumper steel or hand drills and sledge. It is best to demolish the structure by gradual steps or benches, or a little at a time, especially if located inside or under a building. Holes are drilled, as a rule, from 1 in. to 1½ in. in diameter, and in depth depending upon the thickness of the material, although 6-ft. holes are about as deep as should be shot in close quarters.

The following is an example of what may be accomplished in this direction: One of the concrete abutments under a bridge had become undermined and had fallen into the channel of the stream. The concrete block was straight for the width of the bridge and had wings at each end intended to brace and anchor it into the earth. The block was about 3 ft. thick and 7 ft. wide, and was covered with about 18 in. of water. The wings were out of the water and obstructing the channel.

Ammonia 40 per cent. dynamite was used. The shot broke off the two wings and broke the center section in two parts. The blocks left by the blast were small enough to be handled by laborers, and were used as the foundation for the new abutment, built shortly afterward. The entire job took just one hour.

Sectional Concrete Cribbing Displaces Retaining Walls at Embankments

A FEW years ago concrete cribbing was utilized for retaining embankments in railroad practice, the cribbing being in the form of precast ties and beams. The *Railway Review* states editorially in its May 10, 1919, issue that the use of such construction has now become quite extensive, concluding that it is evident it is being used to good purpose. Furthermore, there is much flexibility in the application of such cribbing, as it can be used either on ordinary slopes or even nearly up to, if not quite to, the vertical. As a matter of convenience and economy, a firm foundation or one extending much below the frost line is not required.

The cost of concrete cribbing construction is said to be less than that of a solid wall of laid-up stone or concrete masonry. Not only is an expensive foundation eliminated, but a yielding or settlement of such cribbing, with the settlement of embankments or of the original surface under it, is not necessarily detrimental to the cribbing. In the case of made ground a solid wall could not be built at all without due consideration as to foundation. A great advantage in the substitution of cribbing for solid construction lies in the salvage value of the former. Should an embankment be changed or taken out of service, the cribbing can be removed and used over again without loss of material. A decided advantage of this special construction is that the cribbing can be built and filled in with common labor.

In the same issue of the *Railway Review* is an article descriptive of a design which has been adopted by the Cleveland & Youngstown R.R. This road is a new electric suburban line from the business center of the city of Cleveland, Ohio, to East Cleveland. A considerable amount of construction is involved parallel or adjacent to existing railway lines and streets, about terminals or in suburbs where permanent cribbing is adaptable. Frequently this suburban line ran at a different level and at such close proximity to existing lines and streets as to require the shoring up either of its own roadbed or that of the lines it paralleled or approached. In view of the elaborate terminal improvements contemplated for the City of Cleveland, it was advisable that certain portions of this retaining wall construction be of a more or less temporary nature; a city ordinance in fact, requiring the use of such construction at certain points. In endeavoring to meet this situation, the engineering department of the Cleveland & Youngstown R.R. cast about for a suitable type of retaining wall construction that would, at the same time, be sufficiently substantial to sustain the heavy traffic carried by adjacent roads and streets as well as that anticipated for its own lines.

Various forms of sectional concrete cribbing were in-

vestigated and finally there was located a considerable quantity of material in the form of 8-in. reinforced concrete I-beams which were being manufactured by a local concrete concern for use in building construction. This material was secured and laid up in the form of a cribbing or retaining wall with such immediate promise of

success, that a study was undertaken with the idea of adapting similar material especially to this purpose.

Naturally where the same I-beam section was used both as header and stretcher, with the flanges of the stretchers in a vertical position, there was concentrated a considerable load in the edges of the flanges after the wall had reached anything more than a moderate height. This had been relieved somewhat by casting on, near the outer ends of the headers, lugs corresponding to the contour of the half sec-

tion of the stretchers (Fig. 1), which served to distribute the pressure more evenly over the 8 x 8-in. area representing the intersection of the horizontal and transverse members. These lugs served primarily to resist such tendency as there might be to crowd the stretchers off the headers where such tendency (due to lateral pressure) might be in excess of the friction between the intersecting members.

It was soon observed that this arrangement would easily lend itself to a more permanent form of construction (Fig. 2) than that originally contemplated and that, with comparatively little embellishment, a type of retaining wall could be procured that would serve its purpose indefinitely; while it would at the same time offer so great an advantage in cost and dependability, as compared with the solid retaining wall,

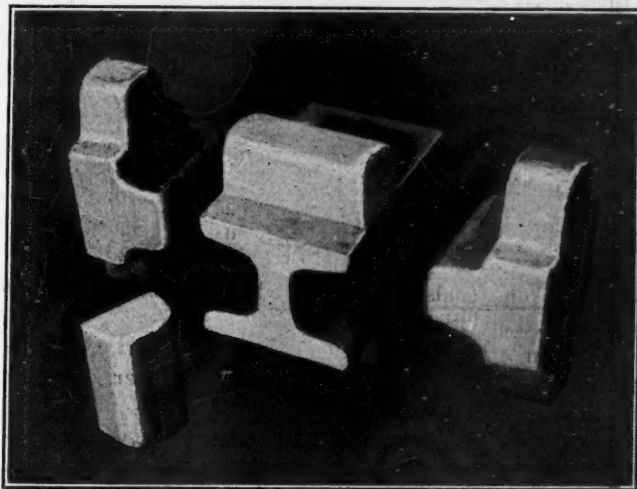


FIG. 1. DETAILS OF "PILLOW BLOCKS AND FILLERS" USED IN SECTIONAL CONCRETE RETAINING WALLS

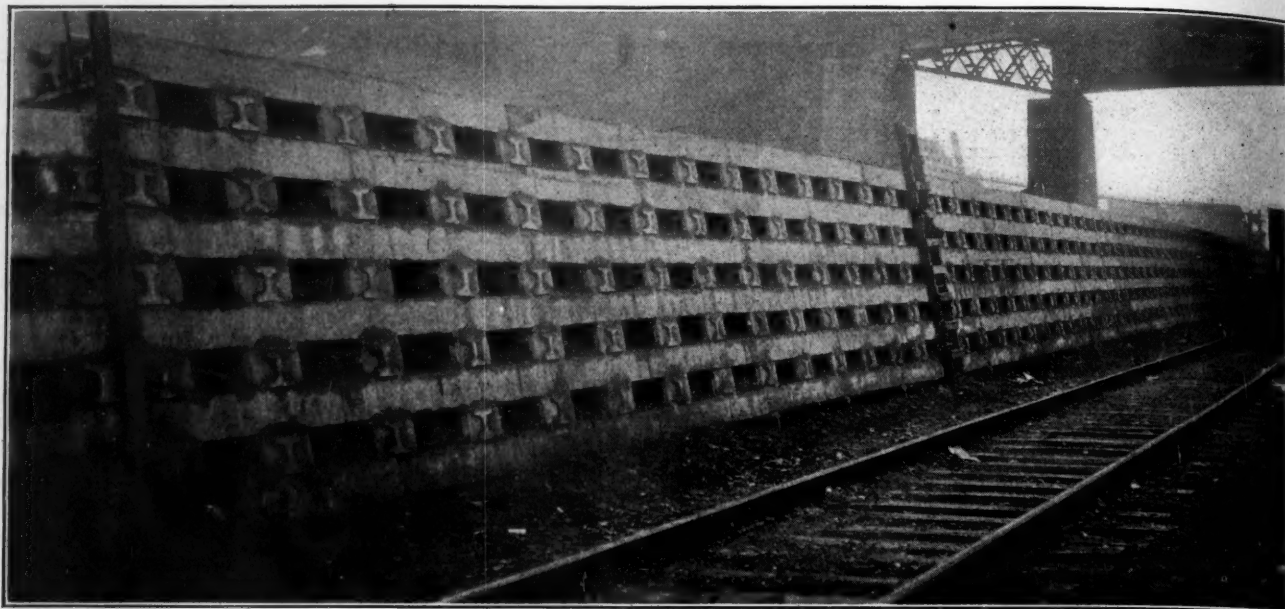


FIG. 2. SECTIONAL CONCRETE RETAINING WALL IN PERMANENT FORM

as to warrant its use generally in preference to that form of construction. The problem to be worked out was that of securing a form or bearing between the headers and stretchers that would permit them to stand up permanently. By way of meeting this requirement there were devised the so-called pillow-blocks and fillers shown in detailed illustration herewith (Fig. 1). The pillow-blocks are in the nature of 8-in. square pieces 4 in. in thickness. Across one face of each is cast a lug of a contour corresponding to that of one side of the beam. Projecting at right angles from the edge of the blocks are lugs of the same transverse section and of a thickness equal to that of the block. A recess is cast in the back of each block to reduce the weight.

Each intersection of header and stretcher involves the use of two of these pillow-blocks and one filler block, the latter corresponding to the lug cast across one flange

of the stretcher for the purpose already mentioned. In assembling these parts the headers and stretchers are put in position and the filler and pillow-blocks are inserted with sufficient grouting to make a unit structure and give a substantial bearing. In the completed wall this results in a series of substantial columns from bottom to top capable of carrying any load that is likely to be imposed on a structure of this kind (Fig. 2).

Headers and stretchers may be made in any convenient length. In the illustration, the headers and the resulting columns appear at 3-ft. intervals. It is to be observed, however, that only one-half of the apparent total number of headers in the completed wall are used, each alternate header being a dummy only 12 or 14 in. in length (Fig. 3). The manner of assembling is such as to stagger the dummy headers with the full length headers so that while the vertical bearings lines are



FIG. 3. REAR OF SECTIONAL RETAINING WALL, SHOWING USE OF DUMMY HEADERS

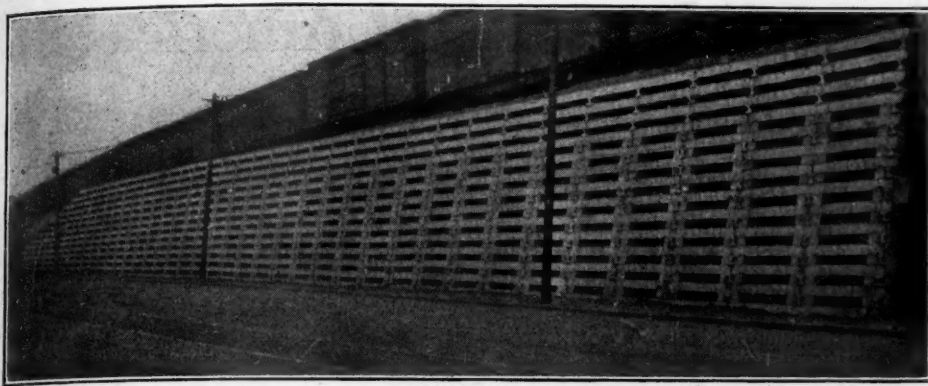


FIG. 4. TEMPORARY SECTIONAL CONCRETE RETAINING WALL

preserved, no element of irregular lateral stability is introduced. A further precaution whereby to secure this same result lies in the staggered joints of the stretchers. These details are clearly shown in Fig. 3.

In setting up the walls as illustrated a batter of 2 in. per foot has been allowed. This is provided for in the slope of the first series of headers and follows thereafter in the progress of construction as a matter of course since the supports for the inner end of the headers are 8-in. sections corresponding to the stretchers themselves. Back filling proceeds as the wall is built up, preferably with some porous material such as cinders, which is tamped sufficiently to insure a firm backing for the cribbing and at the same time drainage is not interfered with. At Kingsbury Run and Fifty-fifth Street, Cleveland, a wing-wall has been constructed after the manner just described. This wall is 35 ft. in height at its highest point and is stepped off to ground level as required by the contour of the slope behind it. A suitable coping slab has been designed to lay over the double course of headers at the top of the wall for use in finishing the tops of either wing or retaining walls.

To summarize, the simplicity of this form of construction, its cheapness, and the rapidity with which it may be erected, combined with its dependability gives it a very pronounced advantage over the solid retaining wall that it is designed to supplant. In preparing foundations it is necessary to go no further than the frost line. Permanent drains need or need not be installed, depending on local requirements. Common labor is all that is required under the direction of a foreman to erect a wall of this nature. Curves may be followed or angles introduced without the necessity of special shapes or forms other than those used in straight way construction. The sections as employed weigh 26 lb. per lineal foot and about three lineal feet of the standard section are required per square foot of wall area. It is estimated that a retaining wall of this type ordinarily can be erected at about one-third of the expense of a solid wall serving the same purpose.

At many of our large coal operations, transportation conditions around the mines and tipples or breakers closely approach those common to trolley lines and railroads. At the tipples, for example, the empty and loaded sidings are at different levels for long stretches of parallel track which run so close together as to require retaining walls. In many cases the road bed of the loaded track at such points is secured by stone or concrete retaining walls. In some instances a reinforced-concrete cribbing could be used to equal advantage and the cost of construction reduced.

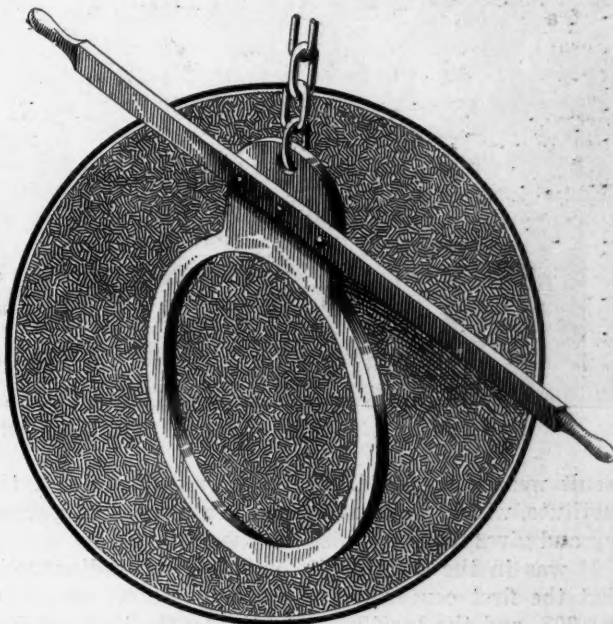
The illustrations and the description of the practice of the Youngstown & Cleveland R.R. offer suggestions to the managers and engineers of coal operations and coke plants. The reinforcing material used by the suburban trolley line was I-beams; it happened to be available at the point in question at reasonable rates. Around mines various reinforcing material is available from time to time—old T-rails, structural shapes and so on.

This material can all be used in the form of concrete cribbing described, the details of the construction of the cribbing varying with the type of reinforcing material used.

Ingenious Form of Car-Door Lifter

BY RALPH W. MAYER
California, Penn.

Many methods are used to raise the car door when dumping is performed by means of a crossover dump. The accompanying illustration shows a ring about 10 in. in diameter that engages the hook on the end of the car door and raises the door so that the coal may slide out of the car. Above the ring is a plate about 5 in. wide, with rounded corners. This is welded to the ring and forms an integral part of it. An iron bar



RING ENGAGES HOOK ON CAR DOOR AND LIFTS LATTER, PERMITTING COAL TO SLIDE OUT OF CAR

about 3 ft. long, with a handle on each end is riveted at its middle point to this plate. The ring may thus be easily guided to place from either side of the car. A chain fastened to the plate extends to the roof of the dumphouse where it is secured to a beam. This chain is placed in such a position, and is of such length, that the ring will catch the car-door hook when the car comes to rest on the dump. The bar handle is used to guide the ring over the hook and to remove it therefrom after the car has been dumped.

Mine Inspectors' Institute of America

BY JAMES T. BEARD
Senior Associate Editor, *Coal Age*

THE tenth annual meeting of the Mine Inspectors' Institute of America was held July 8-11, 1919, at Indianapolis. In a spirit of loyalty to their respective governments and with a desire to do all in their power to win the war, the mine inspectors of the United States and Canada dispensed with the holding of their annual meetings and bent every energy to the work of producing coal.

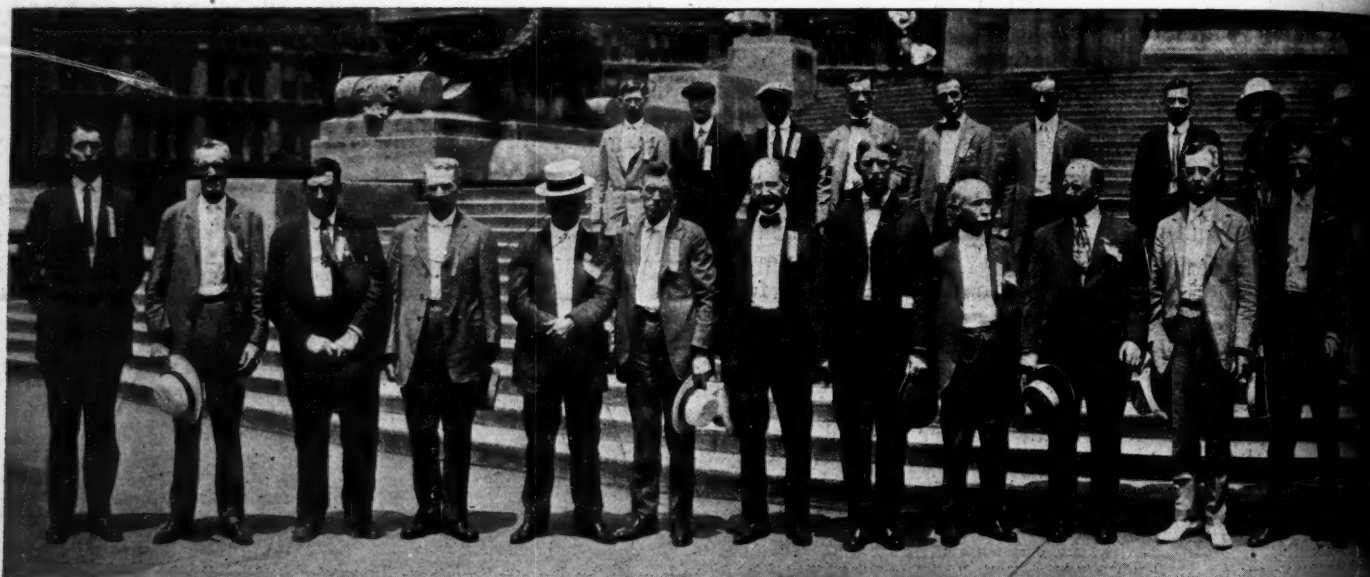
It was thus, after an interval of three years, that the members of the Institute again assembled at the call of their secretary and took up the work of discussing ways and means of making mining operations safer and the lives of mine workers happier. Although the notices announcing the meeting were necessarily late in reaching the members, between forty and fifty inspectors responded and a most enjoyable and profitable meeting was the result.

Since the inspectors last met, June, 1916, at Joplin, Mo., there have been many changes in the mine-inspection forces, in this country and in Canada. The

and conserve the natural resources of the country. The governor assured the Institute that he would gladly render it and its members any assistance in his power that would enable them to prosecute their work.

The next speaker was Hon. William Green, who, as representing the International United Mine Workers Organization, felicitated the members of the Institute on the work done by them during the trying months of the war. Mr. Green referred briefly to the splendid record of the miners, whose loyalty could not be questioned when their labor in the mines raised the yearly production of coal in this country to over 600,000,000 tons. It was a most gratifying result when the cry was "Coal, coal, coal and more coal." In the face of this great demand, the faithful manner in which the mine inspectors had performed their duties had prevented any large mine disaster.

Mr. Green analyzed the situation as involving two chief considerations: (1) Conservation of human life in mining. (2) Conservation of coal as fuel. He urged



MEMBERS AND GUESTS OF THE MINE INSPECTORS' INSTITUTE OF AMERICA IN

result was a large addition to the membership of the Institute, which was a noticeable feature of the gathering and gives much promise for the future.

It was in the state capitol building, at Indianapolis, that the first conference of mine inspectors was held, in 1908, and the Institute organized. On that account, it was fitting that the first session of this decennial meeting should be welcomed by the governor of Indiana, in the Hall of Representatives, in the Statehouse.

The opening session of the Institute was called to order promptly at 10 a.m., Tuesday, July 8, by Charles H. Nesbitt, chief mine inspector of Alabama and third vice president of the Institute.

Mr. Nesbitt then introduced Governor James P. Goodrich, who extended a cordial welcome to the members of the Institute and told, in a few well chosen words, how much he appreciated the efforts that mine inspectors in all the states were making to increase safety in mining

that the broadest powers be conferred on mine inspectors to enable them to act promptly where the occasion may require and thereby save life and property—such action, however, to be subject to review by a court.

In closing, Mr. Green referred to the thousands of tons of coal that are now being wasted by improper methods of mining. He stated that every ton of coal left in the mine was a lost ton and a crime against future generations.

The chairman then called on H. M. Wilson, director of the Department of Inspection and Safety, The Associated Companies, Pittsburgh, Penn., who responded in behalf of the Institute, expressing the appreciation and thanks of the members for the kind and generous welcome accorded them.

The chairman then called on the following members, who, in turn, addressed the meeting: James T. Beard, senior associate editor of *Coal Age*, New York City;

James W. Paul, engineer Federal Bureau of Mines, Pittsburgh, Penn.; John Dunlop, former district mine inspector, Peoria, Ill.; Cairy Littlejohn, chief mine inspector, Indianapolis, Indiana.

The chairman then read a telegram that had just been handed him. It was from President Graham and expressed regret of his inability to be present and wish for a profitable and enjoyable meeting. The session was then closed by adjournment, to meet, at 2 p.m., in the Palm Room of the Claypool Hotel.

The afternoon session was devoted to the appointment of committees and the reading and discussion of the president's annual address, which had been forwarded to and was read by the secretary. At five o'clock the meeting adjourned to observe a first-aid demonstration given on the lawn surrounding the Statehouse.

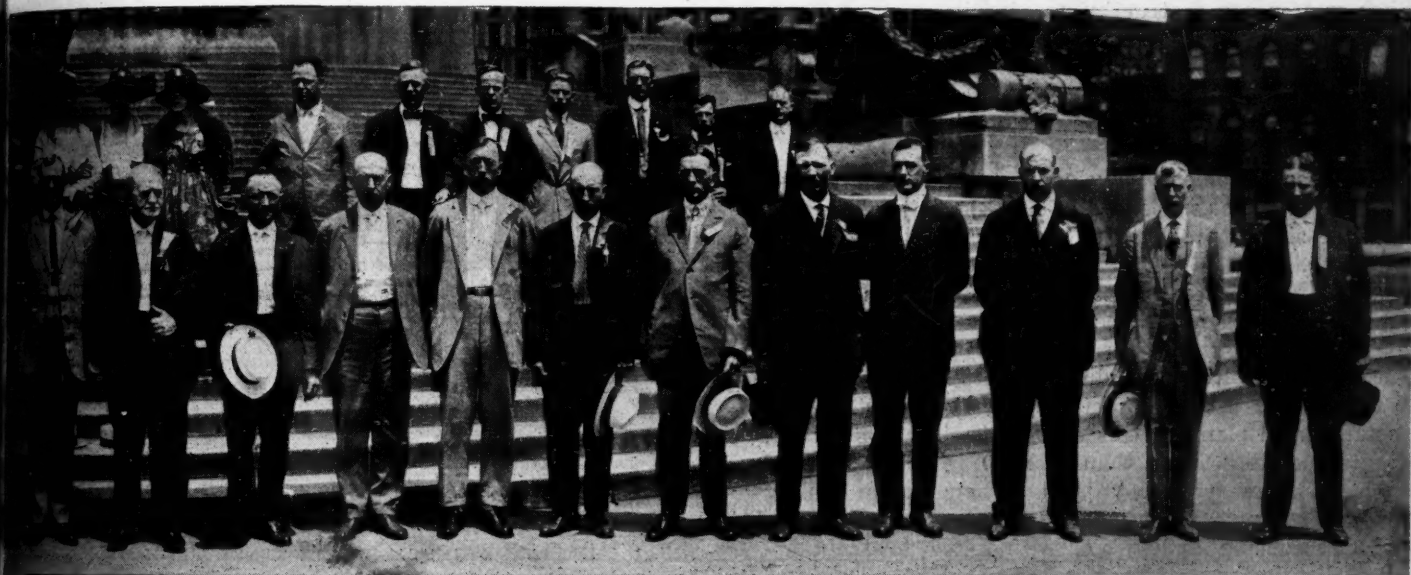
In the evening the Institute was entertained by the local committee of arrangements, in the banquet-hall of the Claypool Hotel and, after the feast, listened to speeches by Governor Goodrich, James Taylor (better known as "Uncle Jim"), Secretary Paul, and others.

Wednesday, July 9, was devoted to the business of the organization, the members and invited guests assembling in the Palm Room of the hotel. An interesting paper on "Compensation Insurance as an Aid to the

the Mine Inspectors' Institute of the United States of America," by J. T. Beard, was called, but Mr. Beard deferred the reading of his paper, stating that business of greater importance awaited the action of the Institute and, as chairman of the Committee on Resolutions, asked for consideration of the resolution presented at an earlier session, regarding the use of permissible explosives in mines and urging state legislation regulating the handling and storage of all explosives in and about mines. This and other resolutions received favorable action by the Institute, after careful discussion and amendment. All the resolutions adopted by the Institute will appear later in the published *Proceedings*. At a later hour the session adjourned.

Thursday, July 10, the Institute members and their friends were taken by train to Terre Haute, and enjoyed a never-to-be-forgotten boat ride up the picturesque Wabash and inspection of what is known as the "Submarine Mine" at Tecumseh. A bountiful box luncheon had been provided by the committee of arrangements and music and dancing completed the pleasures of the occasion.

The following day, Friday, July 11, found the Institute party en route to Vincennes where they were met at the station by the mayor of the city and escorted



ATTENDANCE AT THE TENTH ANNUAL MEETING AT INDIANAPOLIS, JULY 8-11, 1919

State Mine Inspector of West Virginia" was read by Inspector J. G. Vaghan of that state and discussed by the members. In the afternoon, the members listened to an address on "Coöperation Between State and Insurance Inspectors," by H. M. Wilson, of the Associated Companies, and discussion of those present.

The reading of papers and discussions were interspersed by reports of the committees on membership and resolutions. Many new members were received and the Institute took favorable action on numerous important resolutions that will be published later in the *Proceedings*. The session was closed with the reading of a valuable paper on "A Method of Humidifying Coal Mines to Prevent Dust Explosions," by Secretary J. W. Paul.

Owing to the shortness of time and the unfinished program, it was found necessary to hold an evening session. At that time, the paper on the "History of

to waiting automobiles. After a drive through that ancient and picturesque town, the party was driven to Bicknell and inspected the surface equipment at Mines Nos. 1 and 2 of the American Coal Mining Co. Mine No. 1 recently held the world hoisting record, while Mine No. 2 has one of the largest, most complete and up-to-date plants in the country, being electrically equipped throughout.

The party was dined by the company at Bicknell, and, returning by automobile to Vincennes, enjoyed a banquet in the evening, at the hotel. Following the banquet, there was music and dancing to a late hour, thus bringing to a close one of the most enjoyable and profitable meetings of the Institute. It was decided to hold the next annual meeting at Cleveland. All the officers of the Institute, by vote of the members present, were continued in office another year, owing to the interruption of their work caused by the war.

Use of the Dorr Thickener and Classifier in Coal Preparation

Methods and apparatus long employed in the wet concentration of ores may well be applied to the separation of fine coal from its wash water. Such a separation may be made practically complete, thus recovering not only the fine coal, but the water accompanying it, which is discharged in a clear state and ready for reuse.

BY JOHN GRIFFEN
Scranton, Penn.

IN THE anthracite field wet methods of preparation have become almost universal. In many bituminous regions such methods are being steadily adopted. These methods produce their special and peculiar problems. Among these are the recovery of the fine coal, and the waste water, and the prevention of stream pollution. In many coal-mining districts the mine water carries excessive quantities of free acid and acid salts. Such waters are destructive to pipe lines, pumps and preparation equipment, as well as to vegetation when discharged into streams. Treatment of such water chemically is effective and economical provided the precipitated substance can be recovered from the water cheaply.

All these problems involve the presence of solid material mixed or suspended in large quantities of water and are simply problems of wet classification and dewatering.

These problems early faced those engaged in the wet treatment of such ores as copper, lead, zinc and tin. The introduction of Dorr thickeners and classifiers so successfully solved the difficulties that today these machines are used in practically every important wet metallurgical plant on this continent. The world over, plants handling more than 150,000 tons of material each 24 hours are so equipped. Their use in milling low-grade copper ores, where large tonnages must be handled cheaply and efficiently, pointed to their applicability to the quantity production methods employed in coal-preparation plants.

A brief description of the principles of construction and operation of the Dorr thickener and classifier will bring out their usefulness in solving certain problems in the wet preparation of coal. The Dorr continuous thickener is used for the collection and dewatering of fine solids mixed or suspended in a liquid. Its operation is entirely automatic and continuous. Power and attendance requirements are almost negligible. The thickener mechanism may be installed in any form of circular tank or basin up to 200 ft. in diameter.

The Dorr thickener mechanism is shown in Fig. 1 installed in a steel tank. The tank may be constructed either of steel, wood or concrete as the nature of the service and comparative cost may dictate. The feed enters the tank at the center from above. The solids settle to the bottom of the tank, while the liquid overflows at the periphery into a collecting trough. The thickener mechanism, suspended in the tank from the superstructure above, consists of a central vertical shaft

with radial arms equipped with ploughs to bring the settled solids, by means of a slow rotation of the mechanism, to a discharge opening at the center of the bottom. The settled solids as a thick sludge can be discharged at this point by gravity or piped to a pump for delivery to any desired point.

The superstructure carrying the mechanism may be of steel or wood, and may be supported by the tank or

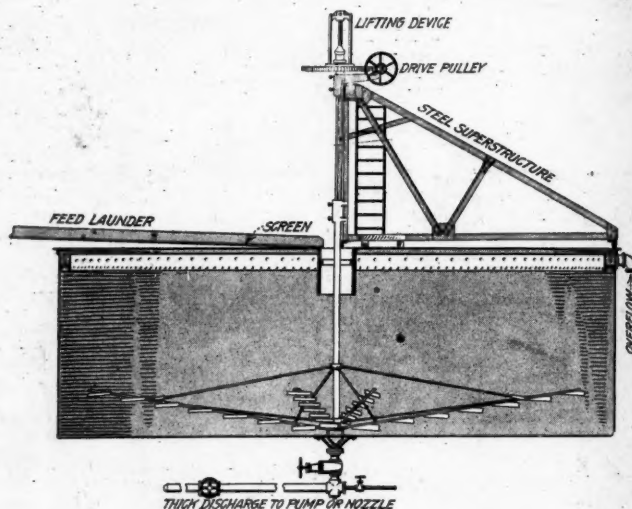


FIG. 1. MECHANISM INSTALLED IN STEEL TANK

independently. If convenient the superstructure may be incorporated with the roof trusses of the tank covering, should such be provided. Power is delivered to the mechanism by means of pulley and worm reduction gearing.

Arrangements are provided for quickly and easily raising the shaft and arms so that they will not become embedded in the settled solids should the power be shut off for any length of time. The shaft can be gradually lowered again while running.

The operation of the thickener may be so controlled as to deliver an overflow either entirely clear or containing a desired percentage of solids. The proportion of liquid in the sludge discharge can also be varied at will between wide limits. For a thickener of given size the natural settling rate of the solid matter in the material being handled and the rates of feed and underflow determine the amount of solids in the overflow.

The thickener may also be operated to separate the suspended solids into two sizes. Coarse particles settle

more rapidly than fine ones of the same specific gravity, so that it is possible, by suitable adjustment of operating conditions, to secure a reasonably clear-cut separation of the solids at a given fineness. When so used a thickener is termed a hydroseparator.

The Dorr classifier is used for obtaining a close separation of coarse particles from finer ones suspended in a liquid, for dewatering granular material or for counter-current washing of granular solids. As with the thickener, the operation of the classifier is automatic and continuous, and the power and attendance required are exceedingly slight.

In Fig. 2 is shown a standard duplex classifier with steel tank. Where solutions handled would attack the steel, wood tanks may be employed; if necessary the mechanism can be made acid-proof.

The Dorr classifier consists essentially of a settling box or tank in the form of an inclined trough open at

to the initial position at the end of the stroke, thus completing the cycle of movement.

In the duplex classifier illustrated, the rakes are arranged to alternate in such a manner that the weight of the moving parts is largely counterbalanced and the power required is only that necessary to overcome friction and to advance the settled solids. The design is such that all parts subject to wear are well removed from exposure to the material treated.

The material to be treated is fed across the width of the tank, where the liquid produces a pool. The granular solids settle to the bottom and are advanced up the inclined bottom of the tank by the rakes. After emerging from the pool and while ascending the sloping bottom the solids have an opportunity to drain before being finally discharged from the end of the tank. Any fine and more slowly settling solids overflow the closed end with the liquid. The agitation near the

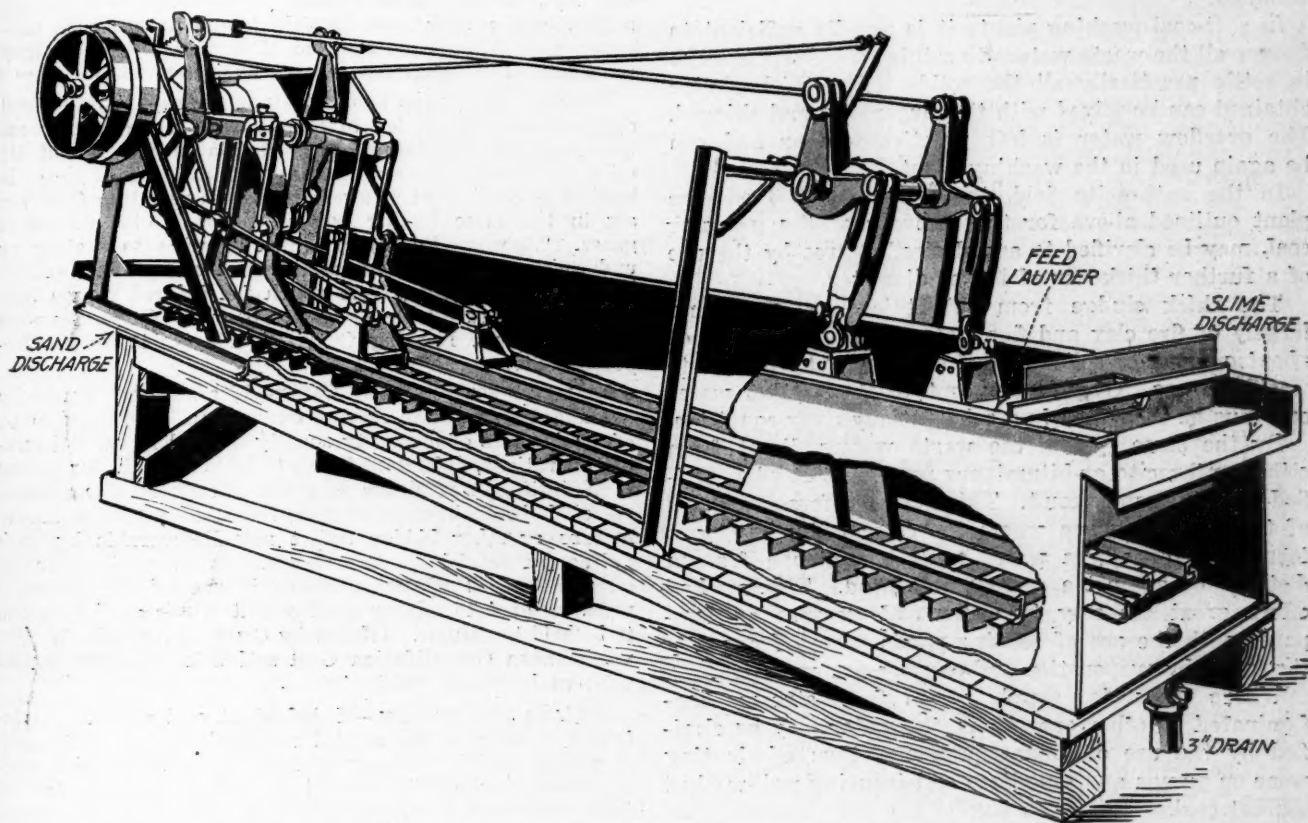


FIG. 2. STANDARD DUPLEX CLASSIFIER WITH STEEL TANK

the upper end and equipped with mechanically operated reciprocating rakes which remove the coarser material as fast as it settles onto the bottom of the tank, the liquid or liquid and fine solids overflowing at the closed end. The tank may be set at any desired slope, usually 2 to 2½ in. to the foot.

The rakes are carried by suitable hangers from bell cranks connected by rods to levers which terminate in rollers. These latter press against cams attached to the crank shaft, which is driven by belt through a countershaft and spur gears. The rakes are lifted and lowered at the opposite ends of the stroke by the action of these cams. The horizontal motion is produced by the cranks and transmitted by rods to the rakes. The motion imparted to these rakes is therefore a forward stroke along the bottom of the tank toward the upper discharge, a lift of the entire rake at the end of the stroke, a return in the elevated position, and a lowering

bottom caused by the reciprocating motion of the rakes prevents the settling of the fine particles and at the same time is not sufficient to cause the overflow of the larger grains. By control of the slope of the tank bottom, the speed of the rakes and the dilution of the feed, the character and size of the two products can be definitely controlled. The machine will operate under greatly varying conditions and a close separation in size obtained at any point desired.

In anthracite preparation a considerable tonnage of coal passes through the barley screen. This tonnage amounts to from 5 to 10 per cent. of the breaker output and will run as high as 80 per cent. of the output of washeries treating bank or river coal. Most of this tonnage is granular and slightly smaller than barley, and if freed from the fine slimes and water is suitable for mine fuel or salable for use in certain makes of stokers, or for briquetting. This slush consists of from

10 to 30 parts of water to one of solids. By delivering the breaker or washery slush to a Dorr hydroseparator to remove the excess water and most of the slimes, and then passing the hydroseparator underflow to a Dorr classifier for final sizing and dewatering, this granular coal can be recovered practically completely, free from slimes and of a definite size.

Because of the easy control of the two machines the size of the ultimate product can be varied to meet the customers' demands. With the same equipment the product can be made substantially all above 40 mesh, or 60 mesh or 100 mesh, as desired. Should the slush contain considerable granular slate, sand or pyrites these can be removed by placing concentrating tables, Robinson washers or other suitable concentrating devices between the hydroseparator and the classifier. With such a plant, properly designed, a coal product analyzing 15 per cent. ash or lower, if desired, can be cheaply obtained.

In soft-coal washing plants it is usually sufficient to deliver all the waste waters to a thickener large enough to settle practically all the solids. The thick sludge obtained can be mixed with the larger coal and shipped. The overflow water is left practically clear and can be again used in the washing plant.

In the anthracite field, the waste water from the plant outlined above for the recovery of the granular coal, may be clarified to any desired degree by the use of a further thickener of larger diameter.

The thick sludge from this thickener, consisting largely of fire clay and fine slate, in the proportion of about one ton of solids to one of water may be run to waste storage. Over 80 per cent. of the breaker water can thus be recovered in a substantially clear condition.

By the same system the waste waters direct from either anthracite or bituminous washeries can be clarified with the same result. This system offers a solution of the water problem where the clear water supply is insufficient or where water must be pumped from a distance or against a considerable head. This method offers great economy in water and expense as compared with the use of settling ponds, where frequently the losses by evaporation and seepage are excessive.

Where the water supply comes from streams contaminated by other operations, the water may be clarified by the use of Dorr equipment, thus eliminating wear on pumps and pipe lines and insuring well-washed market coal.

Many washing plants depend for their water supply upon corrosive mine water with a resultant high maintenance cost on pumps, pipe lines and washery machinery. By chemical treatment and use of a thickener to remove the precipitated solids, such water can be cheaply converted into a practically clear, non-corrosive liquid, well suited for washery use.

An installation of a thickener of this kind to clarify waste waters can be operated to prevent stream pollution. The thick sludge from the thickener can be stored in a comparatively small pond, which because of the thickness of the sludge and relatively small volume can be built and maintained at small cost.

IN CARRYING a long bar of iron or a plank through a crowded shop, a man should bear in mind that this may be a means of injury to his fellow workmen. It is common practice to carry such material on the shoulders; a better method would be to carry it in the hands—it would be safer for the other employees.

Legal Department

INJURIES IN ILLINOIS MINES—If defendant coal company permitted a miner to work in a mine room under a roof known by it to have been dangerous, it is liable to him for injuries resulting from a fall of the roof. By electing not to be bound by the provisions of the Illinois Workmen's Compensation Act, the employer lost any right to rely upon a defense that the injured man assumed the risk of the accident. (Illinois Supreme Court, *Fromm vs. New Staunton Coal Co.*, 521 Northeastern Reporter, 594.)

CONNECTICUT WORKMEN'S COMPENSATION ACT APPLIED—Mere failure of an injured workman to consult a physician until two weeks after being injured does not amount to such "willful or serious misconduct" as debars his right to an award under the Connecticut Workmen's Compensation Act, although such failure if continued long enough might, in a proper case, be held to amount to such misconduct. (Connecticut Supreme Court of Errors, *Rainey vs. Tunnel Coal Co.*, 105 Atlantic Reporter, 333.)

INJURIES RESULTING FROM NOXIOUS GASES—An Iowa coal operator who has failed to comply with the statutory requirement for maintaining such ventilation throughout his mine as to render harmless and expel all noxious gases is liable for impairment of a miner's health resulting from the air in the mine having become charged with poisonous gases. "A wrongful injury which operates to destroy or undermine or impair the health of another is no less actionable than is a wrong from which the injured person sustains wounds or bruises or broken bones." (Iowa Supreme Court, *Gay vs. Hocking Coal Co.*, 169 Northwestern Reporter, 360.)

LIABILITY FOR BREAKING CABLE—If a steel cable used by defendant operator in moving cars on an incline and slope of a mine was of a quality usually utilized in careful mining operations, defendant is not to be held liable for injury to plaintiff, an employee who was struck by a car when the cable broke because of some latent defect in its manufacture or other hidden defect not discoverable by such ordinary careful inspection as would be expected under the circumstances. Such an accident is one of the ordinary risks incident to mining employment which employees are to be held to assume. (Kentucky Court of Appeals, *Wright vs. Elkhorn Consolidation Coal and Coke Co.*, 206 Southwestern Reporter, 634.)

INDIANA SAFETY ACT—If defendant coal operator maintained in its mine unguarded cogwheels in the mechanism of pumps, and if it was practicable to have guarded such cogwheels, plaintiff is entitled to recover damages for injuries sustained in consequence while at work at the pumps, for this involved a violation of the Indiana Safety Act. An employer's duty under this act to safeguard dangerous machinery cannot be evaded by delegating performance of the duty to some employee—not even to the injured employee. An employee is not necessarily guilty of contributory negligence in remaining at work at a machine not safeguarded as required by law. (Indiana Appellate Court, *Moore vs. Candalia Coal Co.*, 121 Northeastern Reporter, 685.)

EXCLUSIVE SALES AGENCY CONTRACTS—A contract purporting to grant an exclusive local agency for the sale of coal for a longer period than a year is unenforceable unless evidenced by at least some memorandum of the agreement in writing, signed by the party to be charged under the agreement. And where there is a valid contract of this kind, the agent is not entitled, on breach of the agreement, to recover damages as for loss of profits or merchandise he might have sold from his store to employees who would have been employed to deliver coal under the agency contract. Such damages are too uncertain and speculative in their nature to be the subject of an award. (Kentucky Court of Appeals, *Gregory vs. Harlan Home Coal Co.*, 206 Southwestern Reporter, 765.)

Who's Who in Coal Mining

QUIN MORTON, of Charleston-on-the-Kanawha, a director of the National Coal Association and an active, successful coal man, has succeeded where Ponce de Leon failed. In and under the hills of West Virginia he discovered the secret of youth—a mixture of hard work, perseverance and keeping the spirit young—and best of all the elixir—West Virginia's pure mountain air.

Even as years go, Quin Morton is not old, for when a man reaches three-score he may still be in the prime of life. But the point is that no one would believe that Quin Morton was over forty. A glance at his photograph will substantiate this statement. What keeps him young may well be asked. The answer is, his grandchildren—fifteen of them—in whom he glories and by and with whom he drives dull care away. As for the youngsters themselves, they idolize him—for he is one of them. There may also be another reason for his defiance of nature and time, and that is his determination to be, look and feel younger than G. H. Caperton, also of the County of Kanawha.

Almost 62 years have elapsed since Quin Morton breathed his first breath of Virginia air at Charlotte Court House. Upon the death of his parents, while he was still a child, he had to shift for himself. His "education" was limited to that obtained in a private school taught by an uncle. He has received, however, a liberal education in the school of hard knocks and has in the course of an active life acquired a wide store of knowledge and experience.

He began to acquire a real knowledge of men, of business and of values when at the age of sixteen he came to West Virginia, locating in Greenbrier County, where he was a clerk in a store, weighing out sugar and cutting calico. At the age of twenty he became a school teacher (about the hardest work he ever had), and after about three years in that patience-trying occupation he embarked in the mercantile business at Ronceverte. He gave this up in 1883 to travel for a Baltimore shoe firm. He had dealt with heads, previously, but now for five years he dealt with soles. Finally, in 1888, he came in touch with the pockets of humanity, accepting the post of cashier of the Bank of Ronceverte, a post he held until 1895, when he resigned to take charge of the business of Rodes Morton & Co., closing out that business in 1896.

Quin Morton's career as a coal man really dates from 1896, when he became bookkeeper of the Turkey Knob Coal Co. at MacDonald, being promoted in time to superintendent. In that capacity he soon gained a knowledge of the operating phase of the coal business, as might have been expected of a man of his initiative and energy. By 1903 he had organized and had become president of the Morton Coal Co., of Paint Creek. In January,

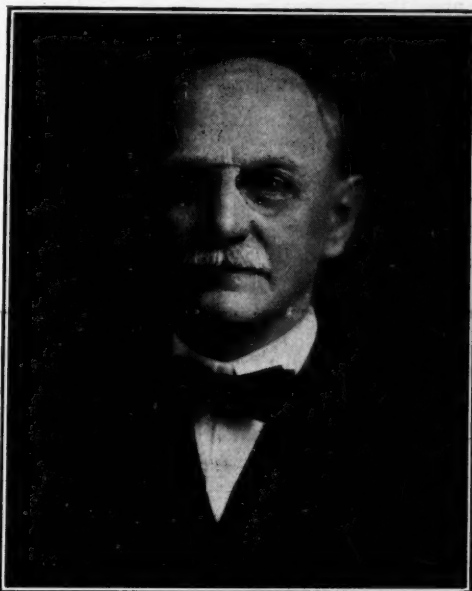
1906, this company was sold to the Paint Creek Colliery Co., and Mr. Morton upon the consolidation became assistant to the general manager. He remained in that position until October, 1906, when he acquired an interest in the Imperial Coal Co., of Burnwell, becoming general manager. He organized the Christian Coal Co. in 1911 and was made general manager of that company, continuing as executive officer of the company until 1915, when the Imperial Coal Sales Co. was organized.

Since 1915 Mr. Morton has devoted a large part of his time to the affairs of the Imperial company, particularly to the sales department, and is today the general manager of the firm. However, the affairs of the Wood Coal

Co., the Peytonia Mining Co. and several other concerns also claim a share of his attention, since he is a director in each of them.

Mr. Morton is not so thoroughly engrossed in his own affairs but what he has time to devote to other causes. He has in fact given his energies liberally to the advancement of the industry in general, as is illustrated by his service as president of the Kanawha Coal Operators' Association upon several occasions and also by the time he has devoted to the affairs of the West Virginia Splint and Gas Coal Association. He is perhaps best known nationally as a director of the National Coal Association, which is doing much valuable pioneering work in the coordination of the soft-coal producing interests to the end that a better relationship be created between operators and consumers.

Quin Morton is a man who derives intense enjoyment from the companionship of his fellowmen. He knows how to apply himself to the tasks in hand and yet he extracts all the enjoyment there is to be had from prosaic business. And when he plays he enters into recreation with his whole being. Men like him because he plays fair, because he is courteous and affable, and because they cannot help it.



QUIN MORTON

Impurities in Raw Coal and Their Removal*

SYNOPSIS—*The impurities in coal, regardless of their nature or of their occurrence, may be in a measure decreased by suitable means. The means employed for this purpose are hand-picking, mechanical picking and washing. Each has its limitations, but a careful application of two or more may do much toward reducing the ash content of the original raw coal.*

THE impurities in raw coal may be conveniently divided into four classes:

1. *Intermixed Impurities.*—In this group is included the inorganic matter which normally yields the ash of the coal. Where the coal-forming material was accumulated under clear water the impurity will be confined to the mineral matter originally present in the original plants; but if the accumulation of the vegetable remains was accompanied by a sedimentary deposit of mineral matter, the resulting coal will contain an ingrained as well as an inherent ash. As the percentage of mineral matter in the material increases, the characteristics of the product change from coal to bone coal. An admixture of more than about 50 per cent. of shale with the coal is termed carbonaceous shale, while a more rapid deposit of clayey matter produces in the coal bed a layer of almost pure shale. To remove the ingrained and inherent impurities from the coal substance is impossible, but it is possible to effect the separation of coal from bone coal and carbonaceous shale.

2. *Infiltrated Impurities.*—The impurities most frequently met with infiltrations are calcite, gypsum and iron pyrites, which are deposited in the coal seam subsequent to its formation. They cannot always be separated from the coal. Calcite and gypsum are found in the cleavage and bedding planes of the coal and therefore occur in the form of thin plates. The effectual separation of these two minerals from the coal depends on the thickness of the layers and the tenacity with which they cling to the coal. Layers of calcite are usually detached easily from the coal, and owing to their brittle nature the layers are broken by the subsequent handling into small pieces. Hence when the raw coal is screened the calcite accompanies the slack, from which its separation presents considerable difficulty.

3. *Interbedded Impurities.*—This group includes impurities which may be easily separated from the coal, since they are to a large extent freed from their attachment during the process of mining. Where the impurity band is hard and exceeds 1 in. in thickness it should be removed from the coal at the working face; but if the band is comparatively friable or is thinner than 1 in., it is loaded with the coal and is brought to the surface to be dealt with there.

4. *Extraneous Impurities from the Roof and Floor.*—Occasionally in a bed of coal material from the roof and floor has been forced into fissures in the coal bed by the pressure of the superincumbent strata. This largely depends on the nature of the roof and floor, and if these are soft such intruding impurities are de-

tached to a great extent from the coal, and this materially facilitates their subsequent removal.

The physical character of the floor and roof has a large influence on the quantity of dirt in the coal. Where the floor and roof are soft and friable a greater percentage of dirt is unavoidably mixed with the coal. Further impurities are mixed with it from the floor by hasty shoveling, especially when the floor has been disturbed by shotfiring. Extraneous matter from the floor may also owe its origin to undercutting in the top layer of the floor instead of in the lower layer of coal. Such impurities are naturally detached from the coal and may be separated from it fairly readily.

The object of removing the impurities from the raw coal is to produce a clearer product. Treated coal yields less ash than untreated coal and its calorific value will be increased in direct proportion to the resulting purity of the sample. In actual boiler practice, however, it is found that the increase in evaporation which is observed with treated fuel exceeds the expected value because the fireman can use the cleaner coal to greater advantage. Hence the more effectively the coal particles are separated from accompanying dirt the more valuable does the fuel become from a commercial and industrial point of view.

METHODS OF SEPARATION

The chief methods employed for separating the impurities from coal particles are hand-picking, mechanical shale pickers and coal washers. Hand-picking is only applicable to lump coal from which all particles smaller than about 2½ to 3 in. in diameter have been removed. The process is one in which the human element plays an important part and which cannot be easily subjected to exact investigation under normal working conditions. It is therefore impossible to give any figures for the process.

A special feature is made at many collieries of picking out all coal particles which are intermixed with impurity bands. These pieces are crushed and then sent with the screened coal to the washing plant. This practice appears to be the only efficacious method of dealing with particles in which the impurity is incorporated with the texture of the raw material.

Mechanical shale pickers depend for their action on the different forms which the particles of shale and coal assume in the raw state. Coal is usually more or less cubical in shape, whereas shale takes the form of flat plates. Hence after the raw coal has been carefully sized by the usual screens it may be fed onto bar screens. The bars are of such a shape that the shale is tipped on edge and falls through the slits between the bars. On the other hand the cubes of coal travel to the end of the bar screen.

Other mechanical pickers take advantage of the fact that coal, especially anthracite, will slide at a more rapid rate down a chute than will shale. This action, which results from the coal possessing a smaller coefficient of friction than shale, is augmented by the regular shape of the coal which allows it to roll down the chute. Hence the coal leaves the chute at a greater velocity than the shale and will in consequence be carried to a more distant bin than the dirt.

The method of cleaning raw coal either by hand-picking or by means of mechanical shale pickers is only ap-

*From a paper presented by F. G. Drakeley, at the January, 1919, meeting of the Past and Present Mining Students' Association, held at the Wigan and District Mining and Technical College, Wigan, England.

plicable to lump coal. Raw coal of smaller diameter than 3 in. has to be dealt with at the washing plant.

The action of the washing process depends on the difference in the velocities with which identically shaped particles of various specific gravities settle in water. If pieces of coal, shale and pyrites of approximately the same shape are dropped into water, the pyrites having the greatest specific gravity falls most rapidly; then comes the shale; and finally the coal follows some distance behind the others. All coal washers utilize this principle in effecting the separation of the heavy dirt from the coal particles.

In a former paper on coal washing in the *Transactions* of the Institute of Mining Engineers, 1918, it was shown that the efficiency of the washing process rapidly increases as the average diameter of the raw coal particles increased up to about 1½ in. After this the efficiency only rises slowly with the increase in size. From this it is concluded that the larger the size of the coal to be washed the more complete will be the separation of the dirt from the coal. Therefore every effort should be made to limit the breakage of the raw coal so as to preserve the large pieces. Any preventable reduction of the diameter of the particles to less than ¾ in. involves a considerable lowering of the attainable quality of the washed product.

The effective separation of the dirt particles from the coal particles is not the primary object of washing, from the colliery point of view. The main object is to reduce the percentage of ash yielded by the washed coal to a minimum. Hence although the separation is more perfect as the size of the raw coal increases, the coal particles themselves, owing to their non-homogeneous structure, deteriorate in quality. Consequently, as the average diameter of the raw coal particles increases beyond about 1 in. two opposing functions come into action. One is the more effective separation of the dirt particles, thus tending to reduce the ash yield; the other is the gradual decrease in quality of the coal particles themselves, which tends to increase the percentage of ash. The latter function eventually predominates and therefore a definite size is reached where the ash content is reduced to a minimum.

As the result of a large number of tests the conclusion has been reached that raw coal of an average diameter of 1½ in. is most amenable to ash reduction by washing, but certainly every precaution should be taken to prevent breakage from reducing the diameter to less than this value.

J. Drummond Paton, of Manchester, suggested that probably the raw coal might be cracked up into what he termed natural fracture, whereby it might be possible to screen from the product coal of a definite dimension which would yield only the normal ash.

Although cases could not be given where such a process is in operation, the following table giving the ash contents and the corresponding sizes of samples obtained by screening raw coal may be of interest:

Ash Content, per Cent.	Size, In.	Ash Content, per Cent.	Size, In.
16.01	24—2½	10.03	1—
16.42	24—2	15.41	1—
11.97	2—1½	16.89	1—
15.93	1½—1	16.67	1—1/10
13.16	1½—1½	20.35	1/10—0
8.75	1½—1	.....	.....

The tabulated results are merely tests on one large sample of raw coal, and before any definite conclusion can be reached a considerable number of experiments

will be necessary, especially as a previous test on another coal completely failed to answer the problem.

However, the results would appear to indicate that if the raw coal could be broken in such a manner as to give particles of a diameter equal to 1½ to 1 in. the accompanying impurity would be broken to a different size. Hence by screening that particular size from the crushed product a sample would be directly obtained that would be comparatively free from impurity.

One of the most vexing questions, and one that needs close attention, is exactly what is to be regarded as legitimate refuse. Thus the foreman in charge of a washing plant might be content to allow dull coal to pass away in the dirt, and owing to the higher specific gravity of the dull coal the tendency would be for this to take place. Of course, a serious loss of good fuel is thereby incurred.

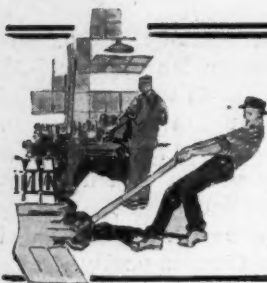
BONY MATTER SHOULD BE REMOVED FROM COAL

In other cases, particularly where a dirty raw coal is being washed, the tendency is for the light carbonaceous shale to be delivered with the true coal. The removal of bone from the coal that is required for coking is a matter of importance, and cases could be instanced where the refuse from the washer is material with a comparatively high carbon content. Indeed, at some collieries that type of refuse is burned under the boiler without any special arrangements being made concerning the draft or area of grate.

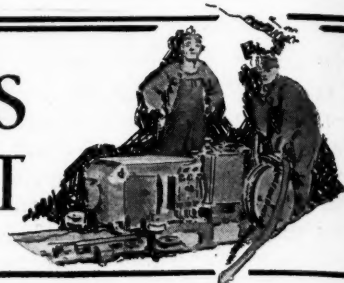
Perhaps it may be legitimate to overlook the discharge, as refuse, by the washing plant of particles of coal which are ingrained with iron pyrites, on the ground that if the pyrites were not removed by some means or other the percentage of sulphur in the washed coal might be so high as to render the fuel unfit for foundry or metallurgical purposes. Incidentally it should be observed that the appearance of pyrite in the coal is no indication of the sulphur in the coal.

One of the most difficult problems which is still awaiting a commercially practicable solution is the question of dealing with the coal dust. As a rule this dust is allowed to proceed with the small coal to the washing plant. There the dust forms a slime with the washing water. The washing water is led to a settling pond in which the slime settles. The slime is subsequently removed, but owing to the fact that no method which is economically applicable on a large scale has been devised for removing the high percentage of water from the slime, the disposal of it is a difficult matter. At some collieries it is consumed under boilers generating steam at a low pressure, but in many cases huge mounds of slime have been accumulated in the hope that further investigation and progress may render them profitably available. Frequently the accumulations assume such large proportions as to necessitate throwing the slime on the waste heap.

Although at the present time there is no sale for slime, it is certainly not a true waste product. Therefore it is of importance to prevent its production. In the washing plant the dirt in the raw coal often disintegrates so that the resulting slime, even if it could be dried, contains more impurity than the dry dust. Hence it would be an advantage to remove all the dry dust of smaller diameter than about 1/20 in. previous to delivering the coal into the washer. The recovered dust might be used in the manufacture of briquets or as a powdered fuel. However, before an efficient dust extractor and recoverer is evolved a considerable amount of research seems to be necessary.

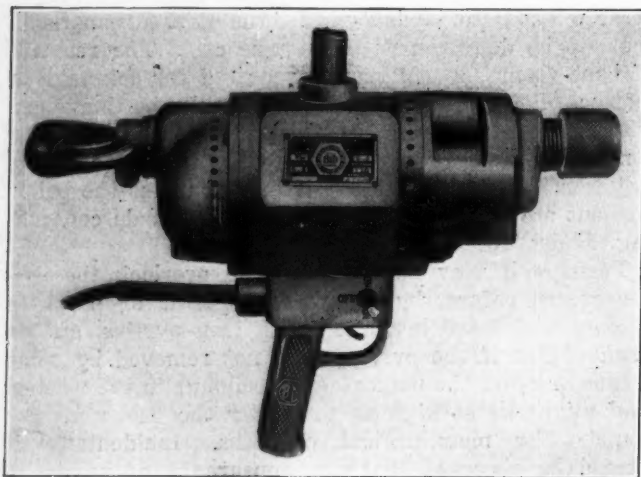


NEW APPARATUS AND EQUIPMENT



New Electric Hand Drill

The Black & Decker Manufacturing Co., Baltimore, Md., has recently added a new size to its line of portable electric drills. This is a machine with a capacity of 0 to $\frac{9}{16}$ -in. steel, and is provided with a No. 1 Morse taper socket. It will drill a $\frac{9}{16}$ -in. hole through machine steel at a rate of $1\frac{1}{2}$ in. per minute without overloading the



NEW SIZE OF PORTABLE ELECTRIC DRILL

motor. In tests, pressure up to 500 lb. has been applied without stalling the drill.

This machine is similar in construction to the other sizes manufactured by the company. The housing is of magnalite, an aluminum alloy of great tensile strength. The gears are packed in grease in a separate grease-tight compartment like an automobile transmission, and the drill spindle runs in a long bronze bushing and against a ball thrust bearing. The motor is air cooled, and in testing these drills have run continuously for 14 weeks, day and night, including Sundays and holidays, stopping only to renew brushes. The weight is 21 lb., and the no-load speed 600 r.p.m.

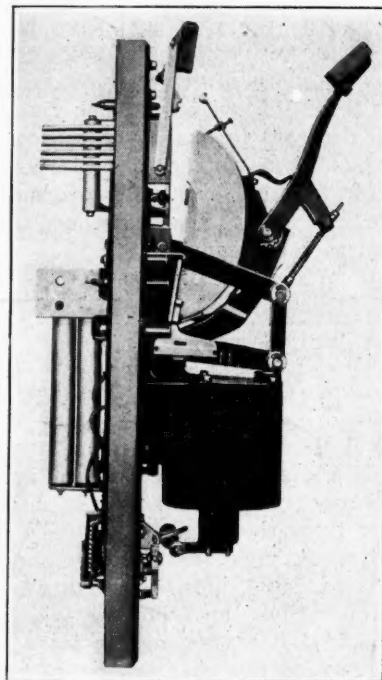
An interesting feature of this tool is the attachment of the Morse taper socket. This is in the form of a separable sleeve secured in the drill spindle by means of a large knurled nut. By unscrewing this nut the entire taper socket can easily be removed from the drill spindle.

The drill shank protrudes slightly beyond the end of the taper socket, and a little tap on the end of the protruding drill shank frees it. This makes the drill unusually compact, and gives it great strength and wearing qualities, as, otherwise, it would necessarily be at some distance from the bearing in order to leave room for the drift pin slot. This drill has the patented pistol grip and trigger switch which characterizes all Black & Decker drills. A view of the new drill is shown in the illustration.

New Reclosing Circuit Breaker

The accompanying photograph illustrates a new circuit breaker, type "LRL" of 3000 and 4000 amp. capacities, recently put on the market by the Automatic Reclosing Circuit Breaker Co. This breaker is an electromagnetically operated instrument, having the following characteristics: (a) The breaker is closed and held closed by means of an electromagnet; (b) it opens automatically in case of overload, short-circuit, or voltage failure; (c) it remains open a definite time interval regardless of cause of opening; (d) in case the breaker is opened by a short-circuit, it makes no attempt to reclose while the short-circuit exists, but closes instantly upon the removal of short-circuit or overload.

The main contact brush is of a laminated butt contact type. The studs are of laminated construction, the lower stud being slotted vertically and the upper stud horizontally. The main contact brush is protected from arcing by an auxiliary copper contact shunt and the final arc is formed on upper graphalloy contact tips. The upper arcing tip is supported on a pivoted support actuated by a strong compression spring so that the



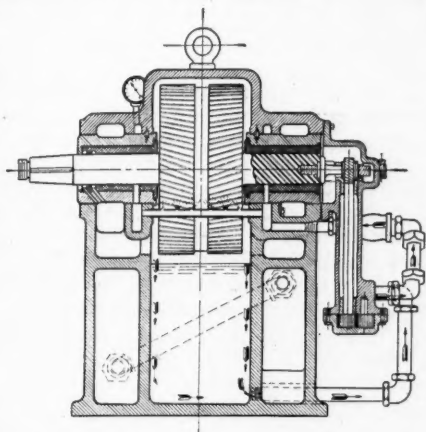
ELECTROMAGNETICALLY OPERATED CIRCUIT BREAKER

upper rear tip follows out at a considerable distance in opening, thereby insuring good contact of the arcing tips until brush and auxiliary contact are separated from their respective contacts. The upper rear arcing tip is also pivoted directly on a bracket so that it is free to align itself with the front contact in all positions. Provision is made for adjusting the tension of the main brush by an eccentric bushing in the brush support.

Turbine Reduction Gears

Terry reduction gears manufactured by the Terry Steam Turbine Co., of Hartford, Conn., are again on the market, not having been obtainable during the last year because of the concentration of this company almost entirely on turbines for the destroyers. Although made primarily for sale with Terry turbines, the gears alone are available whenever a high-grade reduction gear is desired.

In the design of these gears there are a number of features that are particularly interesting. The gears and pinions are of the stub-tooth, double helical type,



CROSS-SECTION OF THE REDUCING GEAR

generated to true form on a Fellows gear shaper. The accuracy of this method of tooth generation is such that no grinding or scraping process is necessary to insure perfect contact of tooth surfaces. Both gears and pinions are interchangeable.

A well-ribbed, double-walled, box-like structure, extending the full depth of the case, forms a rigid support for each pair of bearings. The space between the walls acts as a water jacket for cooling the oil. The ribs between the walls act both as stiffening members and water baffles. The central part of the case, directly under the gears, forms an oil reservoir which contains sufficient oil to supply not only the gears, but also the turbine if attached.

The case being a double-walled, rigid, box-like structure, accurate and maintained alignment of the gears is insured. The casing is bored with the aid of jigs, the dimensions and alignment of the boring being checked by accurate gages. This results in a tight and rigid fit of the bearings.

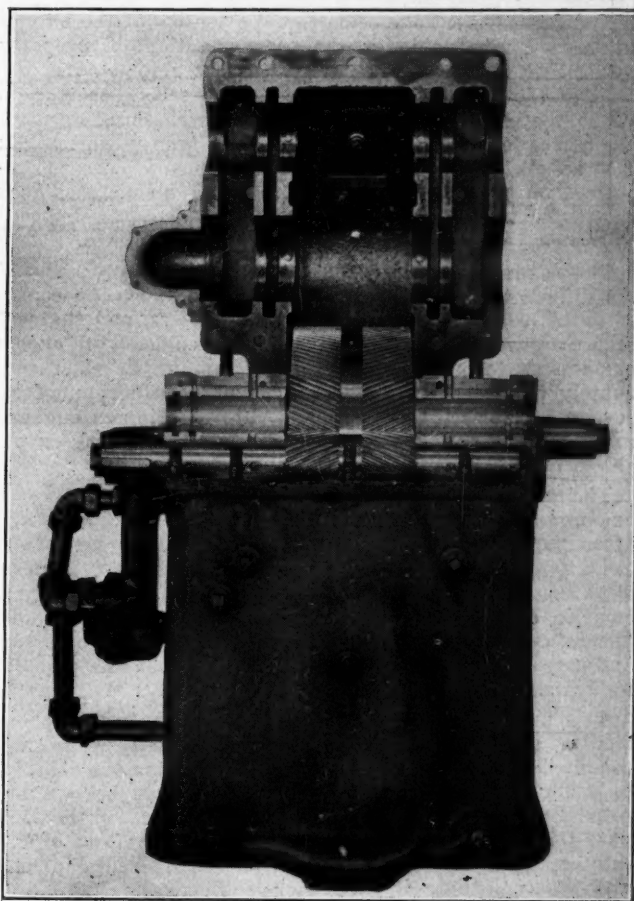
The bearings themselves are of ample size and are split horizontally to permit their replacement without removing the couplings. The bearing shell is of cast iron and is unusually heavy. This is to prevent warping or "pinching-in" from heating, which often occurs in thin shells of bronze or similar metal. The lining used is of highest grade tin-base babbitt on both gear and pinion bearings, accurately machined to close limits, thus requiring little scraping. Interchangeability makes it possible in case of excessive wear to easily and quickly replace a bearing and restore the original alignment.

The oiling system employed is of the forced-feed variety, the ring oiling system having been found unsatisfactory for turbine reduction gear bearings. The oil pump is located well below the oil level in the reservoir, so as to avoid suction lift, thereby preventing ruin

of the gears arising from a possible failure of the pump to function. The oil is pumped from the reservoir through short, direct, brass piping to a self-cleaning strainer, thence through distributing passages to large, annular oil pockets around each bearing shell, and through the spray pipe from which the oil is sprayed, for lubrication of the gear teeth. The oil pressure gage is located in one of the above-mentioned annular oil pockets at the most distant point from the oil pump.

The pump and its bevel gear drive make a complete unit without stuffing boxes or exposed running parts. This unit is so constructed as to be easily accessible. The pump gears may be removed for inspection without disturbing the driving mechanism or oil piping. The bevel gears may also be inspected by removing a small cover. The effectiveness of this lubricating system has been proved by test, for, without any water cooling, the temperature of the oil after long runs has been found to be not excessive.

In spite of the cool operation of the gears, a water cooling system forms part of the standard equipment. The water cooling jacket is hydraulically tested, and when it is once found to be water-tight it is certain that it will always remain so. Because the cooling jackets are in the bearing ends of the case, heated oil



REDUCING GEAR WITH COVER RAISED

draining from the bearings and gears comes immediately into contact with the cooling surfaces before it has the opportunity to heat the oil in the reservoir.

These gears may be furnished for either direction of rotation, the only difference being the location of the oil spray piping above or below the contact point. Great reliability and quietness in operation are claimed for these machines by their maker.

NEWS FROM

THE CAPITOL

BY PAUL

WOOTON



Large Refund Will Be Made to Exporters of American Coal

Fully \$1,500,000 will be returned to exporters of coal as a result of a decision announced, July 18, by the Commissioner of Internal Revenue. The decision amends Articles 13 and 15 of the tax regulations. These articles govern tax exemptions on amounts paid for transportation of commodities in the course of exportation. Commissioner Roper's opinion was accompanied by the following statement:

The constitutional provision that no tax shall be imposed on the exports from any state has been held by the Attorney General to include taxes on amounts paid for the transportation of property in the course of exportation.

Numerous cases have come to the attention of the bureau where amounts paid for the transportation of property were being exempted from tax when the shipments in the light of the law were not in fact in course of exportation. While the constitutional exemption excuses shippers sending goods into export from paying the transportation tax that all other shippers are required to pay, it does not require that a bounty be placed on export business or that it should escape from ordinary burdens that are imposed on property similarly situated in the United States.

The misunderstanding of the constitutional provision and the different interpretations placed on the term "in course of exportation" by the shippers and carriers, and the consequent unsettled conditions in circles engaged in export business, have made it necessary to promulgate rules adequately to protect the Government in the collection of its revenues and at the same time secure to shippers engaged in the export trade the exemption to which *bona fide* export shipments are entitled.

The new regulations were drawn after an exhaustive examination of the subject from a legal standpoint and after numerous hearings where representative men from the different industries were heard at great length. A practical arrangement is provided by means of temporary exemption certificates and certificates of exportation for determining when property is in the course of exportation and providing for exemption from tax on amounts paid for its transportation.

The practice of assembling commodities in pools and similar arrangements at export points from which such commodities might be sent either to a domestic point or to a foreign point was given extended consideration and provision made for the exemption from tax on amounts paid for the transportation of property through such pools into export when the essential character of such shipments and the continuity of their movement can be determined. The manner in which the property usually was disposed of in the pools heretofore would not permit of the exemption from tax of any of the amounts paid for the transportation of the property into the pools, because the property after it arrived in the pool was subject to any disposition which the owner might deem expedient. In fact, the property was ordinarily merely consigned to the pool and either sold before its further domestic or foreign destination was determined, or such destination was determined after it had arrived in the pool. The new regulations provide that amounts paid for the transportation of property on the inland movement to the pool may be exempted from

tax if the shipper has disclosed the essential export character of the shipment at the point of origin by making the shipment against a verified statement of his foreign requirements. Such shipment would move under a temporary exemption certificate stating that the shipment is sent into the pool for the express purpose of being exported and referring to the foreign requirements certificate containing the foreign order against which the shipment is to apply. Upon the shipment from the pool into the export of a like quantity and grade of the property by the first available transportation the shipper would secure a permanent exemption by filing a certificate of exportation, which certificate would also refer to the particular foreign order against which the shipment is applied. In this manner the essential export character of the shipment and its disposition would be disclosed at the time such shipment originated; the property could not be held in the pool for sale; if it were, the final exemption could not be secured and the tax would be collected.

This regulation recognizes that the nature of the shipping papers does not determine the essential character of the shipment and American exporters will not be placed at a disadvantage by reason of shipments under bond from foreign countries which proceed to a point of export in the United States and are there held for sale or for any disposition that the owner may deem expedient. The transportation tax in such circumstances will be assessed and collected on bonded shipments to the extent of the amounts paid for transportation in the United States.

In all cases where shipments are sent into export and this regulation has not been complied with, the tax will be collected, but the person paying the charges for the freight may seek a refund.

EXAMPLE OF CHANGE IN REGULATIONS

Amounts paid for the transportation of bunker coal in no case are exempt from tax. An example covering the application of the change in the regulations is as follows:

A coal-mining company has a contract to supply 10,000 tons of coal to a dealer in Italy. It also has a branch in the Argentine to which it proposes to ship 150,000 tons during the next six months. The contract with the Italian concern and the allotment to the Argentine branch are shown in the Foreign Requirements Certificate which has been filed with the collector at the place where the shipper has his principal place of business. The coal company is endeavoring to obtain a ship to either place, but before a ship is secured it ships 5000 tons of coal to the pool at an Atlantic port intending to export that amount of coal to either place by the first ship it can obtain, and Temporary Exemption Certificates as herein required have been filed covering this tonnage at the time it is shipped. After the arrival of the coal a ship is secured to take a cargo to Italy and it is loaded with 5000 tons of coal from the pool, no part of the coal making up the cargo, however, being a part of the shipment which entered the pool exempt from the tax pursuant to the Temporary Exemption Certificate covering the shipment of the 5000 tons, but the coal making up the cargo was of the same grade and kind as that shipped under the Temporary Exemption Certificate. The temporary exemption of this shipment from tax becomes permanent upon the filing of the Certificate of Exportation as provided in this regulation and the carrier in making up the monthly summary need not check the shipment by car number, but merely by quantity.

If the shipper had secured an 8000-ton vessel and loaded 6000 tons of coal in it for shipment to the Italian concern and there were only 5000 tons of coal in the pool from which exemption from tax had been secured by the filing of the Temporary Exemption Certificate in compliance with this regulation, the shipper would have to pay the transportation tax on the 1000 tons which had been taken from the pool and for which no Temporary Exemption Certificate had been filed.

Not Anxious for Another Investigation of Coal Industry

After listening to a number of witnesses the Rules Committee of the House of Representatives is not at all enthusiastic about another investigation of the coal industry. Hearings were opened by the committee on a resolution by Representative MacGregor, of New York, proposing an investigation of the anthracite situation. If anything is done in the matter it is evident that it will not be confined to the anthracite industry, but will be extended to the whole matter of coal production, marketing and distribution. The suggestion by George H. Cushing, the managing director of the American Wholesale Coal Association, that any investigation would carry with it the expectation on the part of consumers of lower prices, and would discourage buying, seemed to have weight with the committee, as did the testimony of various witnesses to the effect that present prices of coal are justified.

The committee had hard work getting at the real subject before it. A partisan quarrel developed as to the merit of the work done by Dr. Garfield as fuel administrator. One member of the committee suggested that Dr. Garfield should be hanged. Others defended his administration. The snapping back and forth between the Republicans and Democrats on the committee punctuated each session.

The committee is anxious to know if coal has increased in price more than other commodities and if the advance in wages to labor engaged in the coal industry is greater than that in other businesses. Facts and figures in that connection will be furnished from several sources.

In the course of Mr. Cushing's testimony he presented the following information in tabular form:

AMERICAN PRODUCTION

Grade	First Six Months, 1919	First Six Months, 1918	Loss	Per Cent
Bituminous.....	220,361,000	294,837,000	74,476,000	24.9
Anthracite.....	40,204,000	50,812,000	10,608,000	19.8
Coke (Beehive).....	262,510	578,965	336,455	28.0
Total.....	260,827,510	346,227,965	85,420,455	24.5

Anthracite facts:

Production of prepared sizes for first three months of this coal year behind 1918 by 960,000 gross tons.

Domestic coal takes	{ 60 per cent. of anthracite 16 per cent. of bituminous
Steam coal takes	{ 40 per cent. of anthracite 84 per cent. of bituminous
Anthracite supplies	{ 38.9 per cent. of domestic coal 7.5 per cent. of steam coal

April costs—34 independent companies representing 60 collieries, 812,000 tons
Cost—exclusive of selling expense and capital charges, \$5.31
Realization, \$5.02. Loss, \$0.29

Dr. Garfield, on Jan. 31 said anthracite prices should advance 50c. per ton. Companies held same price and added 10c. per month from May to September, or 50c. on prepared sizes. Individuals added 15c. on prepared sizes—after deducting 75c. in February—or 75c. Out of line on Sept. 1 by 50c. too low.

The hearing brought out that householders in the East and in the Middle West are fairly well stocked up for the winter, but in other sections domestic supplies are yet to be acquired. The alarming feature of the situation, it was declared, lies in the fact that there

has been no storage of steaming coal. The railroads, public utilities and industries soon will begin buying heavily and will make it difficult for the domestic user to obtain his coal, it was stated.

The possibility of avoiding a coal investigation, which it is feared will delay buying, has been lessened by the introduction by Senator Frelinghuysen, of New Jersey, of the following resolution:

Whereas, for several years the price of coal to the consumer has from time to time been largely increased; and

Whereas, for a period this increase in price was attributed to existing war conditions; and

Whereas, in spite of the fact that, since the armistice was signed, Nov. 11, 1918, normal peace conditions have prevailed, the price of coal has continued to rise, without any apparent economic, or other proper reason therefor;

Therefore be it resolved, that the Committee on Interstate Commerce, or any subcommittee thereof, be instructed to make inquiry into the cause or causes which have brought about the enormous increase in the market price of coal, and to that end obtain full data regarding freight rates, wages, profits and other matters bearing upon the question under consideration, with a view to determining who, or what, may be responsible for such increase in price, whether due to economic causes, and therefore proper and right, or whether due to manipulation or profiteering on the part of miners, shippers or dealers in coal.

Be it further resolved, that the Committee on Interstate Commerce, or any subcommittee thereof, be authorized and directed to subpoena witnesses and compel their attendance, to send for persons and papers, and do such further acts as may be necessary to secure any and all information desired in the furtherance of said inquiry.

Be it further resolved, that the Committee on Interstate Commerce shall report its findings to the Senate, together with such recommendations as may be pertinent and advisable, with a view either to Congressional or executive action, in order to remedy existing conditions, or the punishment of any individual or corporation deemed guilty of unlawful acts.

And be it further resolved, that the sum of \$10,000 be, and is hereby, appropriated for the purpose of said inquiry, the same to be paid out of the contingent fund of the Senate.

Cancellation of Fuel Agreement and New Bunker Rules and Regulations

The War Trade Board Section of the Department of State has announced that all agreements (W. T. B. Form X-201) entered into with the War Trade Board by persons, firms or corporations in the United States and its possessions and in foreign countries, in connection with the sale or delivery of coal, coke and primary or derivative oils, have been cancelled, effective July 14, 1919. Effective the same day also all existing bunker rules and regulations were cancelled.

General Bunker License Number Three has been issued through the Division of Customs of the Treasury Department, effective July 14, 1919, authorizing vessels of all flags to secure in the United States or its possessions, bunker fuel, port, sea, and ship's stores and supplies in any quantities desired, whenever said vessels are engaged or are about to engage in trade to any part of the world. No formalities whatsoever will be required under the terms of this General Bunker License.

Coal Age Index

The indexes to *Coal Age* are furnished free to all who ask for them. The index for the first half of 1919 will shortly be ready for distribution, and a copy can be had by addressing a postcard to the Subscription Department of *Coal Age*.

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Where There Are No Forces There Can Be No Resultant

IN THE day-wage system the reward for intelligent and energetic industry is largely taken away from the working man. To use the vernacular, he gets his pay for the least amount of work that he "can slide by with." On the other hand, under the piece-work or tonnage system, pure and simple, all reward for efficiency exhibited by the employer is taken from him and given to the employee. The coal operator gets his work done for a given rate whether he helps or fails to help his employee to do a good day's work.

With payment by the ton, there is no encouragement offered the employer to give good service to the man who works for him. Neither the day-work nor the piece-work system acting alone functions perfectly, for it removes from one party or the other the natural reward of efficiency. There are two parties to production—capital and labor. If you would get service from both, both must find an adequate reward for the efficiency of the service rendered.

A coal-mine executive buying certain ancient and inefficient second-hand mining machines was asked why he did so. "Reason enough," he replied; "they are cheap, and I can get the electric-machine scale regardless of the efficiency of the machinery I buy. Why pay three times as much for a new up-to-date machine when all the benefit of the greater efficiency would go to the employee? After all, as everyone knows, the tonnage scale was made to suit the output per man-shift of the machines then in use and did not have the shortwall coal cutter in view at all."

In a sense the purchaser of the historic equipment was right, and we will get no efficiency till the operator is rewarded for any expenditure he may make in purchasing new mining devices to help the miner and loader. Often, all that results from introducing more efficient machinery is a strike and sabotage. The workman is too little versed in economics and engineering to see how the better machinery will help him, and he strikes against its introduction and in some cases he even destroys the machine. The enginery of advance is profit, and the piece-work system takes the profit from advancement and so makes advance impossible.

We hear the unreasonable demands of a few of the labor agitators and wonder that the more numerous reasonable working men do nothing to restrain such men, but instead strike readily with them at their behest. But that surprise is qualified by the thought that when good laws for the protection of life come up in legislative halls, how often do the large number of reasonable operators, in silence, let the unreasonable reactionaries in the industry oppose those remedial measures!

Shall Production Be Limited?

"THERE is a most pernicious doctrine being preached, that if a man does less work there is more for others. The very opposite is true. The more work one does, the more there is for others, for every industry affects every other."

The foregoing words were used by Sir Auckland Geddes, brother of Sir Eric Geddes, in the British House of Commons during a recent debate over the advisability of increasing the Government-fixed price of coal by six shillings, or about \$1.50 per ton. In England the problem of labor is even more acute than it is in this country; so is the proposition of nationalizing the mines. In Great Britain the miners are obsessed with the belief that a large portion of the profits from their labor goes into the pockets of the mine owners and is there beyond the reach of the public and does the public no good. Were the mines nationalized and an equal profit on the sale of coal realized, this profit would not be entirely objectionable since it would enter the coffers of the commonwealth and be expended on enterprises intended for the public weal.

For the past four or five years the commercial, industrial and economic, as well as the political, world has been in a state of eruption. Demand, production, costs and prices have undergone such rapid changes as to be highly bewildering even to the expert, let alone the tyro. The cost of living has mounted by leaps and bounds, and wages have roughly been advanced in proportion thereto.

Broadly speaking, this process has been a closed cycle of multiplying error. The higher wages were raised the higher went the cost of living, because wages enter into and influence the cost of all commodities; the higher went the cost of living the higher went wages, because each individual's income must cover his expenditures. Of course all costs and wages were measured in dollars and cents or some other so-called standard of value.

Reverting to first principles, nobody cares a tinker's dam for a dollar or a franc or a pound as such. A certain weight of gold of a certain fineness has little meaning or utility to the ordinary human being. What interests him, and interests him deeply, is the exchange value, the purchasing power of the little disk of metal we call a dollar or the slip of paper that circulates in its stead. Thus, aside from acquired habits of thought, it matters nothing what the compensation for a day's work may be in dollars and cents, but it matters much what the purchasing power of these dollars and cents may be. Back in the early 90's a laborer could be hired for \$1 a day; at that time a good pair of shoes could be bought for \$2.50. Today, in the same locality, a laborer not one whit more proficient receives \$4 a day while shoes, certainly not superior in stamina and wearing quality, now cost \$10. Other examples of the advance in wages and the shrinkage in the purchasing power of the dollar might be mentioned almost without limit.

The eastern portion of the United States in particular is threatened with a shortage of coal. The miners are going to ask not only for an increase in wages but for a shorter day and possibly a shorter week. The miners must live, have a right to live, and should be able to live in at least the same manner to which they have been accustomed. And yet, if either or both these demands are granted the price of coal must be raised.

Now it takes coal not only to cook food but to haul trains, propel steamboats, drive mills and factories, smelt metal, weave cloth, grind flour and move street cars. In short, all modern civilization is so close an interweaving of various industries that what affects one affects all.

This being the case, what means can be invoked to decrease the cost of living? While there may be others, the greatest and most fundamental remedy is increased unit production. So far as the coal mines are concerned, this may be accomplished either by the more general use of machinery and mechanical devices (in certain instances) or through the exercise of either greater effort or a higher degree of skill by the manual worker.

For years, four-fifths of the human race has been prostituting its productive energies to the arts of destruction. Today the entire world is short of goods; its warehouses are empty, its shelves are bare. Is it logical to suppose that the pressing needs of humanity, and thus the best interests of the individual, can be most advantageously served through a limitation of useful production?

Civilized man must work either with brain or muscle or both in order to exist; other things being equal, the more he accomplishes the better he lives. The idea that any man or any set of men can permanently benefit through a decrease, curtailment or limitation of useful production is socially iniquitous, for the simple reason that it is fundamentally and economically wrong.

What is the proper pay for a man who, like the miner of Great Britain, produces only 0.89 ton per day? Surely it is questionable whether such a low-producing unit is entitled to a living wage.

Sidewalks a Mining Town Necessity

NO MATTER how arid any climate may be, sidewalks are a much needed convenience. Even in dry weather they make it possible to go from the house to the store, to the school or to the office without wading through the dust, while in wet weather no argument is needed for urging their introduction. In wintry weather the snow serves, like rain, to make roads muddy and sidewalks requisite.

No one can expect a prosperous looking town where there are no sidewalks. The office, the amusement hall, the store and the houses cannot be clean so long as there are no sidewalks provided. All that can be said about gardens and lawns fails to equal what can be said about sidewalks, for while the former improve the appearance of the towns, sidewalks improve the appearance not of the town only but of the interior of the dwellings and of the inhabitants themselves.

People will not dress well if they have to wade in mud or dust, and if they do so dress the dirtiness or dustiness of their apparel inevitably makes their clothing appear out of place and anything but becoming. Consequently where there are no sidewalks everything appears bedraggled. There can be no social life for there can be no cleanliness.

The absence of sidewalks increases the work of everyone without any compensating advantage. Where sidewalks are not built weeds grow, and then, even if the walks are clean, travel is dirty for the weeds are sure

to be covered with a thick layer of dust which is disturbed by every passer-by.

The frequently noticeable difference between the apparel of inhabitants of cities and the clothing of people in the country is almost wholly a reflection of the condition of the sidewalks and crossings. What is within the bounds of frugality in a city is improvident in a village, not because fine clothing is not as appropriate in one as it is in the other, but because what is kept intact in the city is speedily destroyed on the muddy and dusty country roads or village streets.

Let no one say that wages are high in America, for in doing so he disguises a cardinal fact. Let him rather say that unit production is high. Wherever that is true unit satisfaction is high accordingly.

Pumping Problems East and West

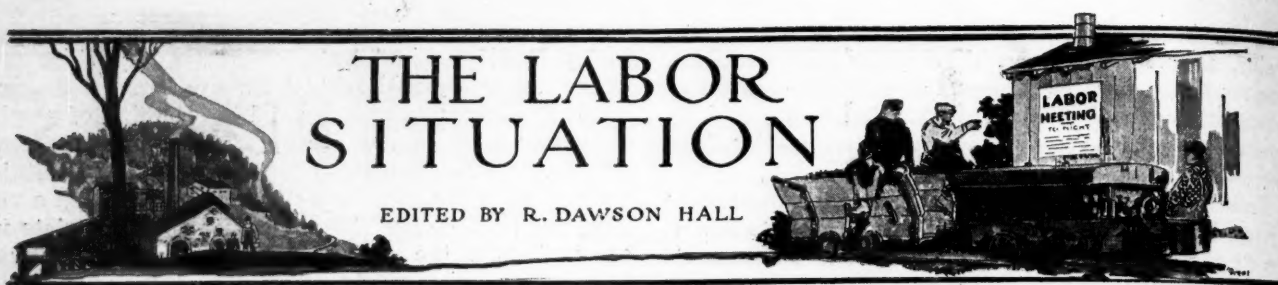
QUITE different are the pumping problems of the Eastern to those of the Western bituminous mines. If the Western mines were as wet as the Eastern the cost of keeping them dewatered would be immense, because Western coal measures, for the most part, dip as they enter the hill and often reach immense depths. Similar difficulties have been met in anthracite mines and in metal mines, but not without increasing the costs of mining considerably.

Fortunately, or unfortunately, many Western coal mines are quite dry. Some, so far, have had no water pumped or drained from them, what little water enters them being spent for evaporation. Yet these mines have a pumping problem, because water must be pumped into them from nearby surface points for the purpose of sprinkling the deadly coal dust that gathers in them.

In some workings all trips are sprinkled, both on entering and leaving the mines, the roadways also being generously moistened by water and steam. Some mines are pumping water from their profoundest depths for use in sprinkler lines. Some even leave water in storage underground during the wet winter season and pump it out in the dry summer to use, perhaps with other water, for sprinkling purposes. There are some mines, however, that are quite wet, for the West is not all equally arid. The amount of water which enters as a result of the caving of workings to the surface and to water-laden strata frequently affords no small problem.

Often the water to be used for sprinkling has to be forced up the slopes of a high hill against considerable head. At other mines, as at Black Hawk, Utah, the risk of fire has made necessary the installation of a heavy pumping outfit at the foot of the hill with high-pressure pipe for delivering water, if needed, in large volume at the mine mouth. The coals of the West, while they contain combined moisture, are dry to the touch. Being quite resinous—streaks and even masses of resin can often be found in them—they burn readily, and a prudent manager will provide himself with means to flood such fires out before they get too great a headway.

Thus it happens that the problem of pumping is as apparent in Western mines as in Eastern, though the difficulties surrounding the solution are at times somewhat different. At some mines the work of the pump is to deliver water to the mine instead of from it. At others it is both to remove and deliver water. In any event the pump is needed, but the type of pump will vary with the kind of duty demanded of it.



General Labor Review

Of leading importance in the news of the week is the action of the mine workers in Great Britain. Unfortunately the miners of the United States are only too anxious to follow British precedents, good or bad, and probably they will emulate the unfortunate example of the British mine workers in demanding that their pay be provided out of the taxes instead of by increased prices as soon as their demanded increases in wage lift the cost of coal so high as to thoroughly incense the American public.

It will be remembered that the British mine workers have been continually asking more and performing less. It is true that the men in the British mines are probably not the equal of those who worked in the underground before the war. But there is no question that the efficiency of the mine workers has declined even since the war ended, and concurrently the mine workers have been seeking more pay and shorter hours.

THE FINE ART OF BACKING DOWN GRACEFULLY

In face of a nation-wide strike the mine worker was promised an inquiry into the justice of his demands with the covert understanding that he would get at least a large part of what he demanded. A Royal Commission sounds like a portentous machine for grinding out the life of the workingman. It is nothing of the sort. It is rather a camouflage to cover an ignominious surrender. The workmen know that it is the "protective coloration" by which ministers of the people—speciously termed "Ministers of the Crown" and "His Majesty's Ministers"—disguise an ignominious retreat.

The Royal Commission reported as desired. Wages were to be raised; profits were to be curtailed; and as wages were to increase far more than profits declined, the Ministry decided that prices should be boosted six shillings per ton. The public was filled with indignation. Here again was the "endless spiral"—higher prices demanding higher wages; higher wages demanding higher prices and so on *ad infinitum*. Wage earner was clearly seen as the enemy of wage earner. If the miner gets more, it must be from those workers who buy the materials excavated, transported or manufactured by the use of coal.

MORE FOR MINING MAKES EVERYTHING COST MORE

The Federation of British Industries declared, and no one could question the statement, that the cost of machinery would be increased from 3 to 10 per cent.; textiles would cost from 3 to 4 per cent. more than before; chemicals, gas and electricity would rise in price 10 per cent. more; the building trades would face an increase in the price of steel of \$6 per ton, while bricks would cost 5 per cent. more and glass from 5 to 10 per cent. The steel manufacturers placed the increase in the cost of steel at 2 pounds sterling, or \$10 per ton.

The mine workers wanted the increase proposed, but did not want prices to rise as a result. Consequently, they insisted that the taxpayer (who, by the way, was groaning under a burden of \$300,000,000 a year, to pay for improvident operation of the railroads, and of \$250,000,000, which was annually paid to reduce the price of wheat) should pay also \$233,000,000 to keep down the price of coal. The Government offered to keep the old price in operation for six months, if only the mine workers would agree not to strike. It undertook, as proposed by the mine work-

ers' leaders, to form a committee of inquiry more compliant doubtless than the spineless Sankey board. But the mine workers' conference at Keswick overwhelmingly decided against the proposal. The burden must fall on the taxpayer and nationalization of the coal industry must proceed at once. The mine workers would not permit the introduction of labor-saving machinery so long as the mines were privately owned.

At last the makeshift ministry of Great Britain plucked up heart enough to declare that the taxpayer could not be made to bear burdens such as this in addition to all the others resulting from the war. On July 18 Andrew Bonar Law declared that, beginning Monday, July 21, the increase of six shillings (\$1.50) per ton would have to come into effect. Then he added, canny Scot, that the Government's action did not preclude the possibility of further negotiations on the subject. Where Great Britain will land, if she make the concession, no one knows. If the coal concession is added to those made earlier she will lose nearly \$800,000,000 each year on her plan of keeping down prices. The loss represents an amount of money that would have run the United States Federal Government before the war. The burden would be the last strain that would break the taxpayer's back, and if industry is to be conducted without gain where will be the profits for the payment of taxes?

As a result of the decision of the Government to make the public pay the whole cost of mining the coal that it uses, the miners went on strike over large sections of the mining field. The Yorkshire mines closed down, the union withdrawing even the pumpmen. On July 21 Premier Lloyd George announced that three mines were flooded and several others were filling with water and the Government was sending men from the fleet to pump out the mines.

STRIKE TO MAKE TAXPAYERS PAY BILL

On July 21 the South Wales mines were hampered by the abstention from work of large numbers of the surface men who were striking for the shorter hours granted the miners and who sought extra pay for week ends. The mine workers in the Mansfield District, of Nottingham, were also striking. Their strike was on the main issue—whether the price of coal should be increased or the mines should be run at a loss at the expense of the taxpayer.

The news of unrest from all over the United States—of which space forbids the recital of any more than a part—shows that the labor relations here, while better than in Great Britain, are by no means satisfactory. At Parsons in the northern anthracite field 1500 men employed at the Ridge Colliery of the Hudson Coal Co. struck because 100 of the employees failed to pay their union dues. Only July 12 the men were instructed by the union mine workers to complete their payments. They were informed that if they failed to do so by July 17 a strike would be called. Payment not being made the miners fulfilled their threat.

A number of boys at the Evans Colliery, at Beaver Meadows, in the Hazelton anthracite field, were put on a 6-hour shift, while the outside men and company hands were allowed to work 8 hours. So on July 17 the boys went on strike and tied up the whole operation.

At the Locust Spring Colliery of the Philadelphia & Reading Coal and Iron Co. the miners during the war were asked to load their own coal, owing to the shortage of laborers. The United Mine Workers of America conceded that this be done. Now the war is over the men refuse to fill their own cars, the union declaring that such action is in violation of the contract.



DISCUSSION *by* READERS

EDITED BY JAMES T. BEARD

Surveying Without Instruments

Letter No. 2—Regarding the suggestion of T. Edwin Smith, in his article on this subject, *Coal Age*, Mar. 27, p. 562, that a mine survey can be made by the use of a steel tape only, when no instrument is available, let me say with emphasis, In that case, the survey should never be made until an instrument is secured and the work can be performed by a reliable and properly qualified surveyor or engineer.

No matter what care may be exercised, in attempting to make a survey with a steel tape and connecting the surface lines with the underground work in a mine, no guarantee can be given in regard to the accuracy of such a survey. It would certainly be bad practice for mine officials to base the continuation of their operations underground on the supposed accuracy of such a survey.

The sources of error in tape measurements are well known, and no reliable mine surveyor or engineer will claim that a survey made by that means is accurate, or can be depended on in extending the mine workings or locating a boundary line underground. A slight error made at the commencement of the survey of a large mine would seriously affect the result at the working face. For this reason the idea of surveying a mine with a steel tape only ought never to be entertained.

AN ACCURATE MAP A NECESSARY GUIDE IN THE DEVELOPMENT OF A MINE

Serious losses of life and property have resulted from incomplete and imperfect mine surveys; and the first consideration in the survey of a mine should be to prevent possible mistakes and insure the accuracy of the results. The plan of a reliable survey enables a mine foreman to lay out the work under ground systematically. Reference to an accurate mine map shows the proximity of the working face to boundary lines and points of danger. Such maps are necessary to insure safe and efficient mining.

The map of a mine is always the guide in its development, and it is both annoying and expensive when calculations based on the mine map prove to be incorrect, because of a mistake or error in the survey. An accurate mine map is a most important factor in preventing undue loss of coal, which is bound to result when the entries and rooms in a mine are badly arranged. The correct location of property lines is of the utmost importance in order to prevent trespassing on neighboring properties, which has often proved an expensive mistake in mining practice. Troubles from creeps or squeezes are avoided by a proper arrangement of the openings and the development underground; and this can only be accomplished by a careful study and calculations based on an accurate mine map.

For work of a temporary character, a survey made with a steel tape may often suffice; but all permanent

roadways and important parts of a mine should be surveyed with the utmost care, by employing a modern instrument for that purpose. A good mine surveyor or engineer will carefully check the adjustment of his instruments before attempting to make a survey.

These remarks are not intended to underrate any ability on the part of the ingenious surveyor to perform certain work without an instrument; but rather to show the necessity of making all mine surveys with instruments of precision, and thus reduce the possibility of making errors that could be avoided by the use of proper instruments. Moreover, state mining laws require accurate mine maps and, to comply with these requirements and in the interest of safe and efficient mining, accurate surveys must be made in every case.

Ladysmith, B. C., Can.

WILLIAM WESNEDGE.

Barometer vs. Outflow of Gas

Letter No. 5—Referring to the question regarding the effect of change in the reading of the barometer on the outflow of gas in mines, it is interesting to note that the use of this instrument, in mining practice, has gradually come to be regarded as essential.

Of the two types of barometers in use, the standard mercurial barometer is almost universally employed in Europe, while the aneroid barometer is quite frequently found in use, at mines in this country. However, both of these types depend solely on the changes in atmospheric pressure which are determined by the weight of the atmosphere acting on the instrument.

The term "barometric pressure" has the same meaning as atmospheric pressure, but is expressed in inches of mercury instead of pounds per square inch, 1 in. of the mercury column of the barometer corresponding to 0.49 lb. per sq.in. of atmospheric pressure. The effect of barometric changes on the gases, pent up in the waste areas of a mine, can only be understood by a thorough familiarity with the laws of the expansion of gases due to changes in pressure and temperature.

LAWS CONTROLLING EXPANSION OF GASES

Boyle's law relates to the effect of pressure on the volume of gas or air, while Charles' law, sometimes called Gay-Lussac's law, concerns the effect of temperature on the volume of gas or air. The former of these two laws makes the volume of air or gas vary inversely as the pressure it supports, while the latter makes the volume vary directly as the absolute temperature. The rate of expansion is the same for all air and gases.

Bearing these rules in mind, it is evident that, during the period of a falling barometer—the period when mine officials are warned to exercise extra precaution—the gob gas confined in the waste areas of the mine will expand and flow out onto the airways, owing to

the decrease in atmospheric pressure indicated by the fall of the barometer. At the same time, the air in the live workings of the mine is expanded in the same proportion, and this, in a measure, resists the expansion of the pent up gases.

Allow me to suggest, here, that the increased percentage of gas in the workings is not due solely to the fall of barometer. The effect produced on the ventilating fan by the barometric fall is such as to cause a slight decrease in the efficiency of the fan and a similar decrease in the quantity of air circulated. The ultimate result is to augment the effect in the mine by slightly increasing the percentage of gas in the workings.

DROP IN OUTSIDE TEMPERATURE MAY COUNTERACT EFFECT OF FALL OF BAROMETER

Again, let us assume that the fall of barometer is accompanied with a considerable drop in the temperature of the atmosphere. The former acts, as before, to expand the air and gases in the mine. But, if the drop in the temperature of the outside air is considerable, say from 40 or 50 deg. to zero, the effect will be to increase the density of the air revolved in the fan, which increases its efficiency as a ventilator. The effect of the change in temperature on the surface does not materially alter the temperature of the air in the mine workings, owing to the intake air being rapidly heated in passing into the mine.

In this case, the combined effect of the drop of outside temperature and the fall of barometer is such that the one partially or wholly counteracts the other. The claim of some authorities that the fall of the barometer precedes its effect in the mine is thus seen to depend on many conditions, which make such a rule pure assumption.

Someone has suggested that, in order to maintain a constant mine pressure when the fan is blowing air into the mine and the barometer is falling, it would be necessary to increase the speed of the fan, thereby increasing the ventilating pressure but maintaining the total pressure on the mine air constant. In other words, the increase of pressure due to the fan takes the place of the decrease of barometric pressure, keeping the absolute or total pressure constant.

When the fan is exhausting air from the mine, the same reasoning would make it necessary to slow down the fan to maintain a constant absolute pressure in the mine. This, however, would cause a decrease in the quantity of air in circulation and increase the percentage of gas in the workings.

LOWEST RECORDED BAROMETRIC PRESSURE

The lowest barometric pressure ever recorded in the United States occurred at noon, Thursday, Mar. 25, 1909, when the pressure of the atmosphere, at sea level, was 28.48 in. of mercury, which was 1.44 in. below the normal reading. The average fluctuation of the barometer is much greater in this country than in England. Here it is not uncommon to experience a variation of 1 in. in a period of 48 hours. While the average range in this country may be taken as varying from $\frac{1}{4}$ to $\frac{3}{4}$ in., that in England is said to vary from $\frac{1}{4}$ to $\frac{1}{2}$ in. The maximum range of barometer in this country may be assumed as not exceeding 2 in., which amount is rare in occurrence.

Speaking of the two types of barometer, my preference has always been for the aneroid compensated

for temperature. It is my experience that the aneroid adjusts itself more promptly to atmospheric changes than is possible in the mercurial barometer where the movement of the mercury column is very sluggish. Also, the aneroid is small, compact and portable.

The instrument consists of a metallic box or vacuum chamber, which is supported against the atmosphere by the tension of a spring. The movement of the flexible disk forming the wall of this chamber is communicated to a needle whose reading is registered on a dial that is graduated to read very small changes in atmospheric changes. The construction of the mercurial barometer is well known and need not be repeated here.

Wheeling, W. Va.

R. Z. VIRGIN.

Letter No. 6—The relation of barometric pressure to the outflow of gas in mine workings is a subject worthy of discussion and, already, some interesting and important points have been brought forward for the purpose of showing to what extent barometric readings can be taken as a guide to safety in coal mining.

As is well known, the barometer is one of the instruments used in mining practice to warn mine officials of changes taking place in atmospheric pressure, and which affect the volume of air and gases in the mine, and call for extra precautions to be taken in order to maintain a safe condition of the mine air and prevent danger.

IMPORTANCE OF BAROMETRIC READINGS RECOGNIZED BY REQUIREMENTS OF MINING LAWS

No doubt should exist in any one's mind regarding the efficacy of the barometer when used for this purpose. Not only do mining authorities advocate its use, but its importance is emphasized by the requirements of our state mining laws, which call for a barometer and thermometer to be placed at the entrance of all mines generating gas. This requirement of the law is as important as that calling for a water gage to be placed in the fanhouse, or underground between the intake and return airways, to show what ventilating pressure is produced.

The fact is well known that an increase or decrease of atmospheric pressure causes a corresponding compression or expansion of the volume of air and gas contained in the mine. According to Boyle's or Mariotte's law, the volume of air or gas varies inversely as the pressure it supports. However, aside from this knowledge of the law of contraction and expansion of gases, further information is required to determine the practical effect of barometric changes in mines.

It is incorrect to assume that a high barometer or a low barometer is indicative of safe or unsafe conditions in the mine atmosphere. What is important to ascertain is whether the barometer is rising or falling; and the mercurial barometer does not afford this information, which is only given by a recording barometer or "barograph."

The barograph is a particular form of the aneroid barometer and is provided with a needle that moves up and down over a revolving chart. The result is that a pressure curve is drawn on the chart by the needle and shows at a glance whether the barometer is rising or falling; or, in other words, whether the atmospheric pressure is increasing or decreasing and at what rate, since the chart is revolved by clockwork, at a uniform rate. The pressure curve drawn by the needle on the

chart shows the rise or fall of the barometer in fractions of an inch, each hour of the day or night.

It is my belief that changes in the mine atmosphere always take place from one to six hours before any indication of such change can be observed in the mercurial barometer. This appears to be due to the fact that air or gas is more sensitive to changes of atmospheric pressure than the mercury column of the barometer.

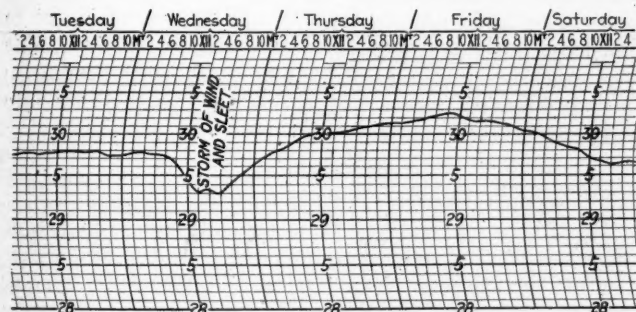
RAPIDITY OF FALL DETERMINES DANGER IN MINE

The result is that the gases confined in abandoned portions of the mine expand immediately with any decrease of atmospheric pressure. Whether a fall of pressure will produce a dangerous condition of the mine air, however, will depend on the rapidity of the fall and the volume of the space where the gases have accumulated, together with the percentage of gas present in such areas and the volume of air in circulation in the mine.

A considerable fall of atmospheric pressure distributed over a sufficient length of time will seldom produce a serious condition in the mine, provided the circulation is adequate. Ordinarily, in such a case, the actual quantity of gas expanded into the mine workings is so diluted by the volume of air in circulation that the increase in the percentage of gas in the air current is scarcely appreciable.

On the other hand, a lesser fall occurring at a more rapid rate may prove more serious while it lasts. The rate of fall of barometric pressure governs the rate of expansion of the gas-laden air in the mine, and this may prove more than what the ventilating current can handle safely. Since it is impossible to foresee the swiftness of atmospheric changes, the wise plan is to be constantly prepared for such occurrences, by maintaining adequate mine ventilation.

The accompanying figure is a portion of a chart taken from a barograph, and illustrates the manner in



BAROGRAPH CHART SHOWING RAPID FALL AND RISE

which this instrument shows whether the barometer is falling or rising, at any given hour of the day, which is important for the mine foreman to know. It will be observed that this chart shows a very rapid fall of nearly one-half inch of mercury column, occurring in five hours, from 9 a. m. to 2 p. m., Wednesday, followed four hours later by a rapid rise.

This was a very rapid fall of barometric pressure caused by a wind and sleet storm. Such a sudden fall of barometric pressure, if accompanied by an equally sudden rise in temperature, would, to my mind, present the greatest danger, as I believe the rise in temperature will diminish the circulation of air in the mine, owing to the decreased density of the air and a corresponding

decrease in the efficiency of the ventilator producing the circulation.

My conclusion is that if the requirements of the state mining laws regarding ventilation are duly observed and strictly carried out there need be no uneasiness felt in regard to barometric readings, so far as they affect safety in coal mining. Our mining laws require that every mine, when worked, shall be thoroughly ventilated and furnished with an adequate supply of pure air, to dilute and render harmless the noxious gases generated in the mine, and make the mine workings safe and healthy at all times.

Ladysmith, B. C., Can.

WILLIAM WESNEDGE

A. C. vs. D. C. Current in Mines

Letter No. 4—Having worked in mines and assisted in the installation of both a.c. and d.c. current machinery, I was much interested in reading the letters that have appeared in *Coal Age*, in regard to which of these two kinds of electricity is the most dangerous in mining work. There is hardly a doubt but that there will be some difference of opinion regarding this question. However, if I was asked to give a direct answer I would say that the use of a.c. current installed in a mine is no more dangerous to the employees than d.c. current of the same voltage.

In my opinion, a.c. current also has a greater range of usefulness in mining work than d.c. current. The former can be used directly for hoisting and pumping and, by rectifying, it can be employed to charge storage batteries for use in mine locomotives or for signal bells and lights, by stepping down the current to a suitably low voltage. In the same manner, it can be transformed for the operation of coal-mining machines. In each of these instances, it is my belief that it is safer for use than d.c. current when the necessary precautions are taken in the installation.

When a.c. current is installed in a mine the cable conductors must be properly insulated and covered with a waterproof covering. Also, all controlling apparatus must be placed where it will be safe from interference or meddling and cause no harm or in any way prove a menace to the safety of the mine. The installation should be in charge of a competent electrician, familiar with mining conditions.

ADVANTAGES OF ALTERNATING CURRENT IN MINES

My experience is that a.c. current possesses the advantage of being more flexible when used for the transmission of power into the workings. This current transmitted at high voltage permits of the use of a much smaller wire, which reduces the cost of installation over long distances very materially. It is, of course, necessary to install transformers to step the voltage, up when necessary, or down to what is required for operating the machine or for lighting or signalling. In this manner, it is possible to get any desired voltage, which makes this kind of current adapted to a wide variety of uses in the mine.

In reference to the relative safety of a.c. and d.c. currents, it is true that the general belief is that there is more danger in the use of the former, owing to the generally supposed higher voltage of the current. One often hears the remark made that contact with a live wire charged with a.c. current "will hold a man fast" so that he cannot get away, while d.c. current "will

knock a man down or throw him to one side." I have known many men to be shocked by contact with a.c. conductors and have had the same experience myself. In none of these instances, however, did the current hold the man to the wire.

Judging from experience and observation I will say that much depends on the position of the person when shocked by a live wire. For example, if he is standing or sitting in a rigid position, at the moment of contact with the wire, he is apt to have much difficulty in freeing himself; if, indeed, that is at all possible, owing to the rigidity of the muscles due to the effect of the current on them. On the other hand, if one comes in contact with a live wire when in a position that he will naturally fall when losing control of his muscles, it is clear that his contact with the wire would be at once broken by the fall.

FEAR OF DANGER MAKES MEN CAUTIOUS

Speaking of d.c. current "knocking a man down," I would ask why there are so many killed by d.c. current of 400 or 500 volts. It appears to me that the belief in the greater danger of the a.c. current is based solely on its generally higher voltage. This fact, however, makes it more carefully guarded by signboards and guardboards. Also, a.c. conductors are more heavily insulated, and greater care is used in the installation of the system. Moreover, the fear of the consequences makes a man more careful not to come in contact with a wire charged with a.c. current. But, I want to say that it does not pay to be careless when working around live wires whether these are charged with a.c. or d.c. current.

In regard to the relative advantages of these two kinds of electricity, I have found that a.c. current machinery gives less trouble with sparking of brushes on the commutators, which is so common in the use of d.c. current. Alternating-current machinery is more compact and, to my mind, simpler in operation, requires less attention and causes less trouble with armatures burning out, than where d.c. current is used.

On the other hand d.c. current gives better satisfaction, in charging storage batteries for use in mine locomotives, signalling, lighting, etc. The use of storage-battery locomotives greatly lessens the danger from the presence of trolley wires in the mine workings.

In the cutting of coal with machines, machine runners will generally prefer machines operated by d.c. current, which saves dragging their cables from junction block to junction block when changing from place to place. However, the use of a.c. cutting machines requires practically the same amount of work and are, to my mind, the safest for use.

ELECTRICIAN

Johnstown, Penn.

Letter No. 5—Referring to the discussion of this subject, allow me to offer a few comments regarding these two types of electricity in mining work, both with respect to their relative usefulness and safety in practice. In respect to the use of electric machinery in mining work, I believe this discussion will be practically limited to the operation of mining machines or coal cutters.

Any one having had much experience with electric motors will agree that an a.c. motor is best adapted to the constant speed required in pumping. The a.c. locomotive has not been developed to the stage where

it is a factor in this discussion, although I understand that the single-phase, a.c. locomotive is in use.

In my experience, I recall a well-known make of heavy mining machine, using a General Electric motor and the same type of feed-and-cutter gearing on both a.c. and d.c. machines. The d.c. machine proved much more flexible on the road, owing to the ease of control by the various steps of cutting out resistance. Very little trouble is experienced by overheating the resistance in modern machines.

COMPARING RESULTS IN OPERATING COAL CUTTERS.

The two-speed control of a.c. machines is hard on the truck chains, and especially hard on the friction for moving the machine on the road. But I have known of d.c. machines that have run two years and never had the lining of the truck friction renewed and will probably not require this for two years to come. In these machines the speed is controlled altogether by the motor controller, and the friction is only used as a brake and to drive the truck.

When the d.c. machine is sumping and the operator standing over it in danger of a kickout, he is much better protected than when using an a.c. machine, because he has the controller but partly open, until the machine has cut a foot or two under the coal and is in no danger of jumping sideways.

When the sumping cut has been made and the machine has started across the face, if the disks have become dull the a.c. operator must back farther away from the cutting place, in order to free his bits from the coal. This requires more floor space and consumes time. If he should endeavor to change the bits close to the coal, the new bits coming around will catch and, the torque of the a.c. motor being low on the first or starting button, the cutter chain will hang up and must be thrown out, sometimes, and the machine started back, again losing much time.

New bits always catch in the top and bottom of the cut. If the operator tries to loosen them by reversing the motor and running it back and forth, he is apt to burn the controller considerably and gain nothing. The a.c. machine may cut off many bit clutches, owing to the speeding of the motor and throwing the bits into engagement to free the chains.

NO COMMUTATOR TROUBLE WITH D.-C. MACHINE

It will be claimed by men who advocate the use of a.c. current that they avoid all commutator and motor trouble by the use of that current. However, I know of d.c. machines that have run steadily for two years and never had a brush renewed or a commutator turned down. The latter shows no appreciable wear and has a good color, never sparking. I fail to see how a.c. motors could give less trouble than the d.c. motors operating in this field.

Controllers on both a.c. and d.c. machines give some trouble; but this is minimized by the use of blowout coils on the d.c. machines, which are also equipped with a dynamic brake that stops the armature immediately, by a short circuit through a part of the resistance. Again, a much better power control is provided in d.c. machines.

The three-wire cable required by the three-phase system of a.c. machines means 50 per cent. more feeder line; and the renewal of this heavy cable compared with the 2-wire conductor of the d.c. machines is a big item

of expense, to say nothing of the extra weight of the three-wire cable that must be dragged about the mine.

Regarding the relative danger of these two kinds of electricity, the limit of 275 volts required by the mining law of this state is hardly sufficient to kill a man, unless he is held fast on the wire a considerable length of time. The d.c. current generally knocks him away, and his only hurt is a severe shock. On the other hand, the 275-volt, "effective heating value," of the a.c. current is but 70.5 per cent. of the peak value of the alternating waves in the a.c. system, which subjects a man in contact with an a.c. wire to $275 \div 0.705 = 390$ volts. It is no wonder that this high voltage paralyzes the muscles and holds the man fast, while the current finds a better path through his body.

FATALITY GREATER IN SMALL MINES WHERE A.-C. CURRENT IS PURCHASED

The greater fatality of the a.c. current is demonstrated in this state where the small mines purchase their current from central stations, while the larger mines use their own d.c. current. The result is that hardly a man has been killed by electricity in the large mines, as compared with 5 or 6 such fatalities in the smaller mines, in the last few years. Where it is necessary to step down a high voltage there is always the chance of a transformer breaking down, and the high pressure being transmitted to the machine feeders, although this seldom happens now owing to the care taken to avoid overload.

In a large mine requiring the operation of locomotives, pumps, fans and cutting machines, the installation of a rotary-converter set would prove a good investment, while a smaller mine operating coal cutters only would use a transformer to step down the high voltage for use in the mine. In this district the average depth of the coal being about 200 ft., the more general practice is to carry the a.c. current over the surface to a point directly above the center of distribution in the mine. Here a hole is drilled to reach the workings. A transformer is located on the surface at this point, and a low voltage carried down the drillhole into the mine. This avoids the danger and expense of installing a high-tension cable underground.

R. R. T.

Danville, Ill.

Safety in Mine Timbering

Letter No. 3—I read with much interest the letter of an Indiana mine inspector, *Coal Age*, June 26, p. 1175. Considering the importance of proper and safe timbering methods, and the large percentage of accidents that are due to falls of coal and rock in mines, letters and publicity relative to safety in timbering must always be of the highest interest to everyone concerned in the mining of coal.

Statistics show that as high as 60 and 70 per cent. of all mine accidents, particularly fatal ones, result from falls of coal and rock, which is chiefly due to improper methods of timbering, or no timbering at all. It is shown further that nearly all of these accidents occur in the working places. It is true that many accidents occur from other causes, such as coming in contact with high-voltage electric wires, being caught and crushed by moving trips, firing shots, etc., and we may not cease our vigilance in trying to prevent these; yet it must be remembered that the number of accidents due to bad timbering are alarming and unnecessary.

Today, more than ever before, every effort should be made to minimize mine accidents. A letter that intelligently handles the safety-first idea in mine timbering should receive earnest attention. New ideas should be broadly advertised and old and unsafe practices condemned. The consideration and prevention of accidents from falls of rock and coal should be taught by the "Safety-First" slogan, today, tomorrow and always.

IRON RAILS AS CROSSBARS TO SUPPORT ROOF

The suggestion regarding the use of discarded iron rails as roof supports is good, economical and practical, provided there is sufficient headroom and the bottom of the rails are placed against the roof. There should be a cut made in the rib, on each side of the roadway, from the pavement to the roof, so as to set a good post at each end of the rail, clear of the track and avoid the danger of derailed cars knocking the timbers out of place. The arrangement would give, besides, a more firm support for the rails than when holes are picked into the coal next to the roof. It is important that the man in charge of the work shall have some idea of the strength of materials, in order that he may not try to attempt to support too wide a space with rails of insufficient strength.

Referring again to the fact of the larger number of accidents occurring at the working face, I believe that the most of these happen because miners wait too long before securing the roof in their places with timber. But, while that is true, it is important not to neglect the haulage and travelingways, or any other place where danger may lurk. Reducing the accident record of a mine is a matter that is largely in the hands of the mine officials. Where accidents at the working face are minimized, it will also be noticed that accidents along the haulages and other places are minimized.

INSIST ON MEN TAKING CARE OF THEMSELVES

Of course, accidents will happen in spite of the most careful vigilance, and under apparently the best of conditions and which cannot be attributed particularly to anybody's fault. But, where the foreman and other mine officials properly perform their duties to the men in their charge and insist on these men protecting themselves and their families, it will be noticed that mine accidents are very nearly a negligible and unavoidable factor.

The foreman or superintendent of a mine will not fear being known as "a crank" on timbering where the results accomplished are satisfactory. I have known foremen and inspectors to halt a man loading a car of coal under a dangerous roof condition, and make him set a post before loading another shovelful of coal, thereby probably saving the man's life or at least preventing a serious accident.

While a foreman may cause the production of the mine to fall short a car or two of coal, it is safe to say that he will regain the loss in a day or so, and that he will not have to remind the man of a similar danger when he visits his place in the future. Too much publicity cannot be given the safety-in-timbering idea, and the subject should continue to be as new and fresh in years to come as it is today. We can only minimize the accident records of the country by constantly reminding mine workers of the dangers to which they are daily exposed at the working face.

Thomas, W. Va.

W. H. NOONE.



INQUIRIES OF GENERAL INTEREST

ANSWERED BY JAMES T. BEARD



Preservation of Mine Timber

How to prolong the life of timber is a question of the greatest importance in this locality at the present time, owing to the growing scarcity of timber suitable for mining purposes. When one considers the rapid decay of timber in the mine, necessitating a large yearly consumption in order to keep the mine roads and airways open and the working places in safe condition, the need of adopting means for preserving mine timber is clearly evident.

This being the case, allow me to ask for any information that *Coal Age* and its readers can give regarding the preservation of timber in mine workings and on the roads, travelingways and air-courses of the mine. In the experience of readers, what means have been found most effective for lengthening the life of mine timber? Can *Coal Age* refer me to any literature on the subject that goes into detail regarding the method of treating timber to prolong its life, the equipment necessary for such treatment and the method to be pursued? Any information forthcoming along this line will be greatly appreciated and will doubtless prove of benefit to all.

—, Ky.

T. L.

The question of protecting and preserving mine timber is an important one and has been carefully studied for several years not only by the Forest Service of the Department of Agriculture, but by mine operators, builders and contractors, who are large consumers of timber. In mining operations, it is important to protect the timber not only from decay, but from destruction by insects and by fire, as well as providing against the destructive effects of excessive roof pressure.

The preservation of timber depends very largely, first, on its being cut in the winter season when the sap has drained from the wood; and, second, on the later seasoning of the wood by air-drying. Green timber is very subject to decay in mines.

Numerous bulletins have been published by the Forest Service Branch of the U. S. Department of Agriculture, among which may be mentioned Bulletin 41, "Seasoning of Timber"; Bulletin 107, "The Preservation of Mine Timbers"; Circular 111, "Prolong the Life of Mine Timbers." These bulletins state the causes of the destruction of mine timber and describe in detail the necessary treatment to prolong its life. The destructive effects of the different causes are estimated approximately as follows: Decay, 45 per cent.; crush or squeeze, 35 per cent.; insects, 10 per cent.; waste, 10 per cent.

Peeling the bark of the timber is recommended as a means of prolonging its life, by lessening the inroads of insects and fungous growth. Good ventilation is necessary to preserve the life of mine timber. Coating the timber on shaft bottoms and main haulage roads with "gunite," a mixture of sand, cement and water, applied

with a cement gun, has been found to afford effective protection against fire and insects.

Work of Gathering Locomotives

Practically all of the articles and letters published in *Coal Age*, concerning the use of gathering locomotives in mines, have failed to give important facts that mine superintendents and others are anxious to learn regarding the actual results obtained in the use of this type of locomotive. For example, it would be interesting to know the number of mine cars hauled, their weight when loaded, kind of equipment, grade and condition of track, length of haul, and other like data.

It would be interesting to see a discussion started in *Coal Age* that would bring out the results obtained in practice. It can be readily assumed that there are many readers of the paper who have had practical experience in the use of electric mine locomotives for gathering coal and would be willing to give the results they obtained. It is not sufficient to state, as many do, the tonnage per mile of haul; but, to make the information of practical benefit to others, sketches should be given showing the plan and grade of roads, and the distribution of the work. The method of handling the loads and empties, in gathering the cars to make up a trip, should be described and the number of working places served by each locomotive given.

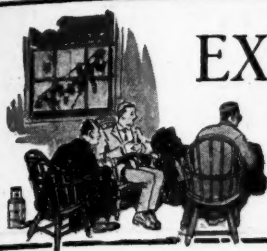
Allow me to suggest that a discussion of this kind would give much valuable information to operators contemplating the installation of this class of locomotive and would indirectly benefit many operators of mines already so equipped, by reason of the friendly criticism that the discussion would naturally evoke.

Drakesboro, Ky.

MINE ENGINEER.

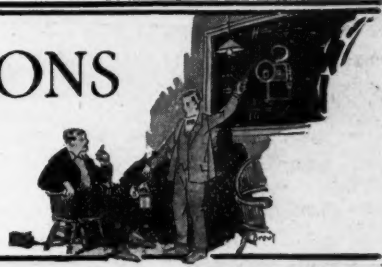
Coal Age is glad to receive the suggestion of this correspondent and to present it for the consideration of readers who are interested in the proposition of the economical gathering of cars in mines. It is a subject that has been treated, as stated, in numerous articles that have appeared from time to time, besides being discussed in this department. However, the discussion has dwelt more particularly on the relative advantages obtained by use of plain and roller-bearing cars.

As remarked by our correspondent, little has been said in reference to the actual results obtained on gathering hauls and giving the data required to form an intelligent judgment of the proposition. It is probable, also, that some of the readers of *Coal Age*, who have developed a more efficient system of accounting, will be able to give comparative costs per ton-mile of haul. There should be no reluctance in presenting information of this kind, as the benefit to be derived is largely mutual, since the most efficient installation can generally be modified and improved by comparison with others, operating under varying conditions.



EXAMINATION QUESTIONS

ANSWERED BY
JAMES T. BEARD



Miscellaneous Questions

(Answered by Request)

[Below are given several questions taken from mining examinations and sent us by candidates who ask for their solution. As will be seen one or two of these questions are incapable of solution on any practical basis and all of them are problems that should never be asked in a mining examination.—Editor.]

Ques.—Show, by example, the comparison between fan and furnace ventilation. Assume two shafts 500 ft. deep; temperature of the downcast, 60 deg.; upcast, 200 deg. F.; barometer, 30 inches.

Ans.—No intelligent answer can be given to this question. While it is possible to calculate the motive column produced by the given temperatures in these two shafts, each 500 ft. deep, assuming a level surface and seam, and from that result to find the unit pressure or water gage producing the circulation in the mine, it would not be possible to establish any basis for comparing this pressure with that produced by a fan, the dimensions and speed of which are not given or the size and length of the mine airways, which determine the resisting power of the mine and establish the ventilating pressure for any given size and speed of fan. The question is unworthy of further comment.

Ques.—Give the size of two airways whose perimeters are equal; the area of one being one and one-half times larger than that of the other.

Ans.—We should be glad to receive a practical solution of this question.

Ques.—The workings of a mine are ventilated with two splits of air. Split A is 1000 ft. long and is passing 20,000 cu.ft. of air per min., while Split B is 200 ft. long and passing 14,142.12 cu.ft. per min., the pressure in each split being 5 lb. per sq.ft. Now, in order to make each of these airways pass the same quantity of air, what should be the area of the regulator opening, the power remaining constant?

Ans.—The question is a difficult one and should never be asked in examination. The fact of the power remaining constant is immaterial, unless it is desired to find the quantity of air in circulation after placing the regulator.

The size of the airways or dimensions of the cross-section are not given; but it is observed that the ratio of the perimeter to the cube of the sectional area is the same in each split, its value being $o/a^3 = 5 \div (0.00000002 \times 1000 \times 20,000) = 0.000625$, as calculated from Split A. Split B, 2000 ft. long and passing 14,142.12 cu.ft. per min., will give the same value, $o/a^3 = 0.000625$.

The placing of the regulator in the shorter split and arranging the opening so that each split will pass the same quantity of air will have the effect, the power re-

maining unchanged, to increase the unit pressure in both splits and decrease the total circulation of air in the two splits. Then, since the quantity passing in each split and the unit pressure for each split is the same, it is possible to find the area of opening in the regulator that will make the sum of the pressure due to the regulator and the natural pressure in that split, equal to the natural pressure in the open split.

Without showing the development of the formula, which is complicated, and indicating the respective lengths, perimeters and areas of the two splits by l_1 , o_1 , a_1 ; and l_2 , o_2 , a_2 , we have

$$\frac{l_2 o_2}{a_2^3} = \frac{l_1 o_1}{a_1^3} + \frac{37.3}{A^2}$$

Then, substituting the value $o/a^3 = 0.000625$ and solving with respect to A , we have, for the area of opening in the regulator,

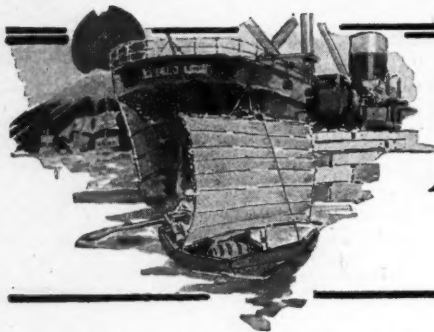
$$A = \sqrt{\frac{37.3}{0.000625(l_2 - l_1)}} = \sqrt{\frac{37.3}{0.625}} = 6.14 \text{ sq. ft.}$$

Ques.—Take a pound of ice at zero (Fahr.) and gradually convert it into a pound of steam at 212 deg. F. Show the amount of heat absorbed in the various stages in passing from ice at zero to steam at 212 deg. F.

Ans.—Taking the specific heat of ice as 0.463, the heat absorbed per pound when its temperature rises from zero to 32 deg. F., is $32 \times 0.463 = 14.8$ B.t.u. Any further addition of heat causes the ice to melt. The change of a solid into liquid is always accompanied with absorption of heat, which becomes latent in the liquid. There is no change in temperature. The heat absorbed when ice melts is called the "latent heat or fusion" and is 144 B.t.u.

The next stage, caused by the further addition of heat, raises the temperature of the water from 32 deg. to 212 deg. F. This rise in temperature is accompanied with an absorption of sensible heat and is approximately $212 - 32 = 180$ B.t.u. Again, the further addition of heat to the water at 212 deg. F. converts the water into steam. The change of a liquid into a vapor is always accompanied with an absorption of heat, which becomes latent in the vapor, and is called the "latent heat of vaporization." There is no change in temperature, but the amount of heat absorbed per pound of water vaporized is 970.4 B.t.u.

[NOTE—The foregoing question assumes a knowledge of data that the average candidate in examination will not be able to recall and should not be required to retain in his memory. The problem is one that intelligent mining men should be able to solve when the necessary data are at hand; but if such a question is asked in examination, the candidate should be permitted the free use of a textbook such as would be available for his use in his daily practice.]



FOREIGN MARKETS AND EXPORT NEWS

EDITED BY ALEX MOSS



Alarming Shortage of Coal in Europe

Shortage of Fuel Prevalent with Probability of a Still More Serious Deficiency Unless United States Exports More Coal—Labor Unrest Responsible for Lowered Production

It has usually been thought that with the coming of peace, despite the appalling destruction of French collieries, the difficulty of Europe supplying itself with coal would pass away. The destroyed mines of France produced 20 million metric tons (of 2205 lb.) in 1913 and at least two-thirds of the destruction by the Germans was systematic and wanton, without military necessity. But even this enormous loss of coal-producing capacity represented only 3 per cent. of the total production of Europe—in 1913, 730 million metric tons—so has a relatively small effect on European coal supplies as a whole; there are other greater factors in the deficiency of production. George S. Rice, chief mining engineer of the Bureau of Mines, Department of the Interior, who has just returned from an extended mining investigation in France, Belgium, Great Britain, the Rhine Valley and the Saar districts, reports to Director Van H. Manning that the shortage of fuel that prevailed during the war continues and there is probability of a still more serious deficiency unless the United States can come to the rescue by an extensive program of exporting.

Mr. Rice finds that while there was virtually no destruction of the Belgian coal mines, of which the Germans evidently expected to retain possession, that Silesian, Polish and the Bohemian mining districts have been, and still are, affected by the military fighting and undoubtedly their coal production will suffer; but most important of all effects on production in Europe is that of the general unrest of labor and changes in labor conditions which have brought about serious lessening of coal production. The cost of production is from 75 to 150 per cent. greater than in 1913, in the various countries, owing to tremendous increases in labor and material. In most countries the wages of miners have more than doubled. The miners are demanding and undoubtedly will receive betterment of living conditions which the miners claimed were very bad in many mining towns. These factors go to make increasing cost of fuel, which in turn will make increasing cost of transportation and manufacturing and cause readjustments in commercial competition between different countries.

In Serious Straits for Coal Supplies

Perhaps the most serious changes, because of the magnitude of the British coal industry, are those taking place in Great Britain, which in 1913 produced 287 million long tons (2240 lb.). Great Britain has always been the largest coal-exporting nation of the world. In 1913 it exported 77 million long tons.

The seriousness of the conditions are strikingly set forth in the statement reported in the *Times* (London) of June 5, 1919, as follows: "Sir Auckland Geddes called attention in the House of Commons yesterday to the serious position of the nation's coal supplies. The output in the year beginning July 16 next, when the miners' working day is to be shortened will be about 70 million tons less than that of 1913, and the deficiency on working about £46,600,000. This will mean an increase of 4s 6d (\$1.06) per ton to the consumer, or a burden on the taxpayer."

In the statement "deficiency on working £46,600,000" refers to the total additional cost of the year's production due to the shortening of hours of labor and increase in wages which under the Coal Control Act would be borne by the Gov-

ernment or else by the consumer through a raise in the price of coal.

This situation results from the so-called Sankey award, which was a report of a Parliamentary Committee called "The Coal Industry Commission," headed by Justice Sankey. The findings of this committee, the Government announced, would be put into effect by the Government. The chief feature of the Sankey report, which became effective July 16, 1919, is the reduction in the hours of labor underground from eight to seven hours and "subject to the economic position of the industry at the end of 1920, the hours of labor underground to be reduced to six." These times are exclusive of the average time of lowering and raising the workman, but include the time he will take in traveling to and from his working place. The mine owners contend that with the seven-hour working day there would be less than six hours' effective work.

Sir Richard Redmayne, chief inspector of mines, testified that, in his opinion, the effect of the reduction of one hour would decrease the production about 10 per cent., and on this basis estimated the output for 1919 would be 230 million tons (of 2240 lb.) and for the year 1920, 217 million tons, or a reduction of 70 million tons from the output of 1913.

British Exports in 1913

The total British exports in 1913 were 77 million tons. If the restrictions in the consumption of coal are removed on the basis of internal consumption of 1913, this would leave but 7 million tons for export. As France, Italy, Sweden, Norway and Spain have largely been dependent on Great Britain for fuel, it can be realized that the situation is a serious one apart from England's loss of practically its only raw product export.

The Sankey report calls for an increase of wages for adults of 2 shillings (46c) per shift. The report expresses the hope that through economies in production, including the most extensive use of machinery underground, the cost to the consumer will not be increased. Nevertheless, the general opinion of mine owners, manufacturers and others is that the price of coal on the markets must rise when the Sankey report becomes effective.

The Commission proposes continuation of the Coal Mines Control Agreement Act of 1918, which determines minimum wages, maximum profits and market prices of coal for internal consumption and shipments to Allies.

The Cardiff price quotations f.o.b. on May 29, for the best steam (Admiralty) coal were: for the Allied nations, 40s. (\$9.20); Spain and South America, 50s. (\$11.50); and other countries, 75s. (\$17.25). For ordinary coal, 37s. (\$8.51), 45s. (\$10.35), and 70s. (\$16.10), respectively. For coke-oven coke, the prices were respectively 54-6 (\$12.54), 65s. (\$14.95) and 65s. (\$14.95). These figures are about double pre-war figures; for example, the prices for Welsh coal Jan. 1, 1914, f.o.b. Cardiff were: Best steam 21s. (\$5.72); bituminous coal, 15s. 9d. (\$3.90); coke, 28s. (\$8.05).

One of the features on which much evidence was brought out by the Commission was the reduction in the output per underground man per shift. The output in 1913 was one ton per shift and in 1915, 1.02; but since that time it has shown a steady decrease, and for the first 20 weeks in 1919 dropped to 0.89 ton per shift, while the absenteeism had been 10.7 in 1913, 8.9

in 1917, and has now risen to 13 per cent. The owners are also seriously disturbed by the proposal of the Commission to restrict their maximum profits to one shilling twopence (25c.) per ton, which in many cases would represent a reduction of 40 to 50 per cent. from pre-war figures and would correspondingly affect mining shares marketed.

Since the Sankey report the Commission has been hearing evidence on the proposed nationalization of the industry, which is favored by the miners, but the owners and manufacturing interests bitterly oppose this plan on the ground that the Government agencies could not conduct the business economically.

Coal Situation in France

The consumption in France before the war was 62 million metric tons (of 2205 lb.), and the production 41 million tons. She imported 18,693,000 tons of coal, 3,010,000 tons of coke and 1,086,000 tons of briquets. Exports were 1,742,000 tons of coal, coke and briquets, the total fuel imports exceeding the exports to the amount of 21 million tons.

The destroyed mines in the Nord-Pas de Calais field produced 20 million tons, so that if the consumption of France within the pre-war boundaries were the same now as it was then, there would be a deficit of 41 million tons. It is, of course, probable that the consumption within this territory will not be as large for some years as so many manufactories in the North of France were destroyed, including steel works which produced in 1913, 3,336,000 tons of iron. On the other hand, during the war, to provide essential materials, it was necessary to make extensions and erect new plants in central and southern France. Many of these plants manufacturing essentials will continue to operate and will require coal.

The taking over by France of its former provinces of Alsace and Lorraine, and its occupation of the Saar district, has materially altered the fuel needs. The Saar in 1913 produced 17,500,000 tons, but the labor situation has lowered the production to the rate of about 12 million tons. Doubtless this output will be increased, but a large proportion of the coal is absorbed locally in the industries of Alsace and southern Germany, so that the loss of the coal in the Nord-Pas de Calais district will not be made good.

By forcing the production during the war in the St. Etienne and other small fields of France by concentration of miners in these fields, temporarily, the production was increased according to published statements attributed to M. Locheur, who has been in charge of the internal affairs of France. Estimates of coal production for the coming year were 28 million tons to 38 million tons, but owing to the shortness of hours and labor unrest the production may fall below 20 million tons, which was the output of the undestroyed mines before the war.

It is estimated by the French engineers and from the observations made by Mr. Rice, which are probably correct, that it will take from two to five years to restore the broken shaft linings, which pass through the water-bearing strata, fissured chalks and marls overlying the coal measures, and to unwater the mines and rebuild the surface plants, and it will take ten years to completely restore the production rate of these mines. A single instance may be cited—the Courrières mines, in which the engineers estimate there were 20 million cubic meters of water. This water drained in through the destroyed shaft linings and in addition was ditched in from surface ponds by the Germans.

In 1913 France imported from Great Britain 12,776,000 tons of coal.

Coal Situation in Belgium

Contrary to the general impression, the coal mines of Belgium were not destroyed by the Germans. The misapprehension

doubtless arises because the Germans did destroy industrial plants, especially iron and steel, in the vicinity of the coal basins. This destruction was so extensive that it was stated by the King of Belgium in March that there were 950,000 men out of employment. Evidently Germany expected until the last few months of the war to retain Belgium. It may or may not have been their intention when they knew that they would lose Belgium to destroy coal mines wantonly as they did in France. President Wilson's notification advising the Germans that punishment would be visited on them if there were destruction of a non-military character may have saved the Belgian mines, so some of the owners stated to Mr. Rice.

During the war Belgian mines were operated by the owners' representatives under military control of shipments. The following table shows the decrease in the number of workers and the production in the course of the war. It is interesting to note the reduction in the yearly output per man below that of 1913.

Year	Number of Workers	Production (Metric Tons)	Yearly Output per Man
1913	145,337	22,841,590	157
1914	129,157	16,714,050	130
1915	123,806	14,177,500	114
1916	126,092	16,862,870	134
1917	111,695	14,919,700	133
1918	110,110	13,821,930	125

Since the retreat of the German army and the armistice, the labor conditions in Belgium have been unsettled and there is a shortage of miners. Some have not returned from the army; doubtless many were killed and wounded in the war; others, driven away by the first advance of the Germans, have engaged in new occupations. The miners have also been unsettled, with the result that they have not worked with their former efficiency. It was thought that the men in idleness in the industrial belt would seek work in the mines, but they do not wish that kind of work and are not forced to take it so long as the Belgian Government provides them with food. On the other hand, the mine owners have not apparently made much effort to hire men who have not been miners previously, as they consider that inexperienced men or men without early training cannot become miners under the difficult underground conditions in Belgium.

The outlook for immediate improvement in production is not hopeful, although there will be some increase. The deficiency in the output from pre-war conditions amounts to 9 million tons. In 1913 Belgium consumed 4 million tons more than it produced, the deficit being met by imports from Germany and Great Britain. Therefore, the total deficiency on a 1913 basis of consumption in Belgium is about 13 million tons.

Coal Situation in Italy

Of the great allied nations, Italy is in the worst situation as regards fuel. In 1913 it produced but 773,000 tons of coal and imported in that year from Great Britain 10 million tons of coal, coke and briquets. During the war its output of low grade anthracite and lignite was increased to a couple of million tons, but at high cost, to take care of the shortage of import coal.

Coal Situation in Neutral Countries of Europe

Spain produced before the war a little over 4 million tons of coal yearly and is said to have increased its output materially during the war. In 1913 it imported from Great Britain 3,649,000 tons. Its natural resources are limited, and it must continue to import a large proportion of coal for its consumption.

Holland produced 2,065,000 tons in 1913, but imported about 12 million tons, of which 2,018,000 tons came from Great Britain, the balance chiefly coming from Germany. Norway, Sweden and Denmark produce a negligible quantity of coal, as is also the case in Switzerland, which was supplied from Germany. The former countries imported from Great Britain in 1913 as follows:

	Metric Tons
Norway.....	2,298,000
Sweden.....	4,563,000
Denmark.....	3,034,000
Total.....	9,895,000

German Coal Situation

The former German Empire was a close second in coal output to Great Britain, producing in 1913: Bituminous coal, 190,109,000 tons; lignite (brown coal), 87,233,000 tons. The largest part of the production was from the Westphalia or Ruhr field in 1913—114,487,000 metric tons—

Foreign Coal Trade Opportunities

A South African electrical power company wishes to purchase the best grades of anthracite coal. Quotations should be given f.o.b. American port or c.i.f. South African port. Reference. Further details may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or any of its branches, by referring to File No. 29,899.

The manager of an import house in England desires to become the representative of an American coal-exporting company interested in export trade. Refer to File No. 29,923.

A mechanical engineer, graduate of an American university, will be in America to secure commission or consignment contracts for sale in Belgium of coal. Refer to File No. 29,945.

which Germany retains under the peace terms. Upper Silesia, which has been detached from Germany, produced 49 million tons of bituminous coal, and the Saar basin about 17 million tons. The new German Republic will have approximately a yearly production, based on pre-war capacities, of about 124 million tons of bituminous coal and about 90 million tons of brown lignite.

Westphalia produced the bulk of the coke of the former German Empire, and this was vital for obtaining the great outputs of blast-furnace iron and steel in the plants of the Rhine valley. There was also sufficient surplus coal and coke to send large amounts to Belgium, Holland and France. But in March, 1919, the German coal owners in a conference with the allies at Cologne, which Mr. Rice attended, declared that owing to the labor unrest and weakened condition from lack of food they had no coal to export over that already going to the "occupied" zones in the Rhine valley. Undoubtedly, the recovery of production in the Westphalian fields will be rapid—perhaps more rapid than that in any other country. Although labor has shown some unrest, it is probable that the miner, because of habit and traditions, will be more ready to settle down with some improvement in wages.

The Ruhr field is capable of more expansion in output than perhaps any other European coal field, but several years at least must pass before production can be larger than it was before the war. The brown lignite field near Cologne can easily increase its output. The beds are very thick, attaining in one place a thickness of lignite free from shale partings of over 300 ft. It is very poor fuel as mined, containing 60 per cent. moisture, but when dried it can be briquetted without binder. The briquets stand weathering. The output of this field has increased during the war from 20 million tons to 27 million tons of coal, including 6 million tons of briquets.

The Ruhr field will be called upon to supply Holland and France with large amounts of bituminous coal and coke, and it is probable that exports to France will be compelled by the necessity of obtaining minnette ore from France for the Ruhr iron furnaces. The German Empire in 1913 used 47 million tons of iron ore; of this only 7,472,000 was produced in Germany proper, including Silesia, which has its own blast furnaces. Former German Lorraine supplied 21 million tons; Luxemburg supplied 7 million tons of minnette ore, and 3,311,000 tons of minnette ore were imported from French Lorraine; the remainder was imported from Spain, Sweden and other countries. Then Germany used about 25 million tons of minnette ore from present French territory. Consequently, Germany will serve its own interest by supplying coal to France to the limit of its capacity.

Political and industrial conditions in Russia, Austria and Poland are still so complicated that discussion of future supplies of fuel is not justifiable. The most important coal field is that of Upper Silesia, which is now largely included in Poland, the southern margin formerly belonging to Austria being in controversy; the eastern part, formerly in Russian Poland, is now included in Polish territory so that Poland is in a strategic position as regards coal supply. Russia has other important fields, but has not supplied enough coal for its own consumption, Great Britain formerly furnishing 6,000,000 tons annually to northern Russia.

Summary of Situation

Western and southern Europe is badly in need of coal. The deficiencies in the several countries were supplied by Great Britain, which now faces a loss of its export business through reduction in its coal production. On a pre-war basis of consumption the following tabular statement gives the deficiency in the various countries in Western and northern Europe which must be met by imports:

	Long Tons
France.....	20,000,000
Spain.....	3,650,000
Italy.....	9,650,000
Holland (other than supplies from Germany).....	2,010,000
Sweden.....	4,560,000
Portugal.....	1,360,000
Norway.....	2,300,000
Mediterranean countries (other than Italy).....	3,500,000
Denmark.....	3,030,000
Total.....	50,060,000

In 1913 Great Britain supplied 31,000,000 tons to North Europe, 32,000,000 tons to France and South Europe; that is, 63,000,000 tons to the above named countries and others in Europe, in addition to which about 9,000,000 tons was sent to South America and 5,000,000 tons to other parts of the world.

If the statements made before the Parliamentary Commission are correct, from the most favorable point of view, as estimated by Sir Richard Redmayne, conditioned on maintaining of war-time restrictions on domestic consumption, Great Britain will be able to supply only 23,000,000 tons of coal for export during the coming year, dating from July 16. If, on the other hand, the domestic consumption was on a pre-war basis, there would be but 7 million tons available. But, on the basis of Sir Redmayne's figures, if all the coal were shipped to western and southern Europe, there would be a deficiency of over 25,000,000 tons without considering the 14,000,000 tons that Great Britain, in 1913, supplied for other parts of the world. There is thus a total deficit of approximately 40,000,000 tons which, if it is to be supplied at all, can be supplied by America only, on the assumption that Westphalia and Belgium are unable to materially increase production for several years. At best there is evidently a large amount of coal that the United States could and should supply to relieve the situation in Europe and in South America, now that there is likely to be enough shipping flying the American flag to take care of the business.

Coal Mining Industry of Belgium During War Period

The region about Charleroi, in southern Belgium, is one of the most important industrial regions of the country, the chief interests being those connected with coal mining; coke, iron, and steel plants; glass factories; and quarries. Coal mining in the Charleroi district continued throughout the war with production diminished all the way from 10 to 50 per cent. Many miners left this region during the war to live in western Belgium, as it was possible in the latter section to engage in agriculture to some extent and thus obtain better food. Those remaining in the Charleroi district had almost no bread during many months of 1916 and 1917, and they ate beet root (betteraves) as a substitute. In the third district (arrondissement) of the Charleroi section, the average monthly production of coal in 1913 was 299,580 metric tons during 552,459 working days for 22,365 workmen, 16,587 being in the mines and 5778 on the surface. The production of coal, in metric tons, for the last three months of the year 1918 was as follows: October, 181,805 tons; November, 39,174 tons; and December, 150,280 tons.

There are 39 coal mines in the vicinity of Charleroi. The Houillères Unies du Bassin de Charleroi à Gilly, whose condition represents in general that of all coal mines at Charleroi, is now employing about 2300 men at its 12 shafts. In 1913 this company had a force of some 5600 men. The present production is practically one-half of the normal amount.

The mines of Belgium in general formed an exception among Belgian industries during the war. They continued their activity throughout the war, with a gradual decrease from year to year of from 8 to 9 per cent. in production. The following table shows in detail Belgium's war-time production of coal in metric tons of 2,204.6 lb. and the number of workmen employed during the war:

Districts Production	1913	1914	1915	1916	1917	1918*
Metric Tons						
Couchant de Mons.....	4,406,550	3,578,810	3,310,200	3,705,540	3,869,680	3,281,721
Centre.....	3,458,640	2,701,550	2,573,430	3,212,860	2,785,400	2,559,615
Charleroi.....	8,148,020	5,764,410	3,875,690	5,223,970	4,671,240	4,493,628
Namur.....	829,900	534,180	410,660	497,150	427,870	374,440
Liege.....	5,998,480	4,135,070	4,007,520	4,223,350	3,153,510	3,112,530
Total.....	22,841,590	16,714,020	14,177,500	16,862,870	14,939,700	13,821,934
Workmen						
Couchant de Mons.....	32,287	30,974	28,096	28,077	30,610	29,074
Centre.....	21,876	21,061	40,445	38,427	32,265	32,691
Charleroi.....	47,963	43,153	22,667	23,233	20,644	20,269
Namur.....	4,779	3,841	3,045	3,552	3,168	2,953
Liege.....	38,432	30,128	29,553	32,803	25,008	25,125
Total.....	145,337	129,157	123,806	126,092	111,695	110,112

* Provisional figures.

Coal Situation in Germany

In a rather pessimistic review of the present position of the German coal industry, the *Frankfurter Zeitung* bewails the fact that while the output in the year 1915 totalled 146,867,563 tons, Germany is now to lose her coalfields in Upper Silesia, while the Saar and Aix-la-Chapelle regions will remain outside her sphere of control. In the same year, 1915, the output in Upper Silesia was 38,106,787 tons, in the Saar region 10,345,417 tons, and in the Aix-la-Chapelle coalfield 2,251,260, or a total of 50,703,464 tons, that is, 34.4 per cent. of the total German output. She is therefore left with an output of 96,164,099, but even this figure requires considerable modifications. The conditions of production have greatly changed since 1915. The average daily dispatch of trucks in Rhenish Westphalia in peace time (1913) was 32,000; in February, 1919, after an improvement in conditions it was only 16,000.

Germany's remaining coal output may, therefore, reasonably be placed at not more than 50,000,000 tons. Of this quantity she is for a period of ten years to be compelled to deliver 21,600,000 tons to France, 6,000,000 tons to Italy, 8,000,000 tons to Belgium, 1,500,000 tons to Luxembourg, or a total of 37,100,000 tons, leaving for her own necessities 22,900,000 tons of her own coal. The total export in 1911 was 31,145,076 tons out of a total output of 158,777,500 tons. Thus, with an output only one-third as large, she is to export 20 per cent. more.

This does not complete the chapter of her difficulties, for 75 per cent. of her coal output is to be delivered at prices fixed exclusively by the victors. Three-fourths of her coal output instead of helping to rescue her from her economic distress will thus be excluded from contributing to her profits.—*Iron and Coal Trade Review*.

Yorkshire Coal Trade

The following review of the coal trade in Yorkshire appeared in *The Yorkshire Post*, under date of June 3, 1919: "In the coal trade circles in Yorkshire, the outlook in the export trade continues to be the main item of interest. A week ago there was a hint as to expected concessions, based on the knowledge that the Coal Controller was reviewing the situation in this department. Since then the South Yorkshire Supplies Committee has issued an intimation that collieries in their area may resume export on a limited scale as from June 2, conditional on all inland demands being met. The aggregate amount allowed per month is only some 25,000 long tons of large coal and 8000 tons of slack, and this quantity has been apportioned in varying amounts to South Yorkshire collieries. It is not anticipated that the condition as to home requirements will nullify the concession for as compared with the total monthly output from South Yorkshire pits the allocation of 33,000 tons for export is as a drop in the ocean.

"The details of the controller's decision as affecting the southern portion of the county were posted on the Yorkshire Coal Exchange in Leeds this afternoon, and there were numerous inquiries as to the position in West Yorkshire. Although there was no definite information on the point, collieries in West Yorkshire may expect to hear something in the course of a day or so. Coal for export from this area is to be available to the extent of 15,000 tons of large descriptions and 8000 tons of smalls per month, and collieries are now being allocated their due share.

"The same condition as to home supplies obtains, but here again no difficulty is anticipated of collieries being unable to take full advantage of the concession

Meanwhile, there is a steady inquiry for all descriptions of fuel, and although the continued spell of warm weather has produced a summer business in the house coal trade, merchants find that they are able to dispose of all supplies that come to hand. The question of reserve stocks is becoming increasingly important, and merchants are being urged to do their utmost in the matter. Their position, however, is by no means an enviable one, for the greatest difficulty is the persistency with which output is kept at a low level by the miners. Until this improves it is impossible to say how the accumulation of stocks can proceed in a satisfactory manner. The view is expressed that the situation must inevitably react upon the export trade."

Under date of July 4 *The Colliery Guardian* reviews the market situation in England as follows: "The recent spell of cold weather has considerably checked the possibilities of landing any considerable amount of stock coal at the various London depots. Supplies are coming forward in better tonnage, but are inadequate to the demand. The coal market at Cardiff fluctuates considerably as the result of labor and other difficulties, causing a decrease in production. The Newcastle coal market is very dull. Local ship owners complain of the diversion of coal vessels for the Spanish ore trade, while the Tyne tonnage market is extremely congested. There is a fairly good supply of coal for home purposes in Yorkshire, and the requirements may be met so far as summer buyers are concerned, but there is little over for the greater consumption of winter.

Reduction in Rates on Coal to South American Ports

The shipping Board has announced that effective Tuesday, July 15, 1919, a reduction of \$2.50 per ton was made in the present rates on coal to South American ports. The following is the new schedule:

To	Per Ton	Daily Dis-charge, Tons	Per Ton	Daily Dis-charge, Tons
Rio de Janeiro, Brazil	.....	.....	\$17.00	1,000
Santos, Brazil.....	\$18.50	600	17.00	1,000
Rio Grande do Sul.....	19.50	500	.....	.....
Bahia and Pernambuco, Brazil.....	16.00	500	.....	.....
Montevideo, Uruguay	17.00	750	16.00	1,000
Buenos Aires, Argentina.....	17.00	750	16.00	1,000
La Plata, Argentina.....	19.00	750	.....	.....
Rosario.....	17.50	1,000	.....	.....
Bahia Blanca.....	32.50	500	.....	.....
Punta Arenas.....	.....	.....	.....	.....
West Coast of South America:				
Coal.....	14.00	750	.....	.....
Coke.....	21.00	525	.....	.....

All of the foregoing is subject to 1500 tons guaranteed daily loading except coke for West Coast 800 tons guaranteed daily loading.

Miscellaneous Notes

Coal is found in various parts of Siberia, and the rise in the price of wood has led to the exploitation of the mid-Siberian fields. Rich coal beds exist on the Island of Sakhalin and along the Pacific coast. Deposits of iron ore are found near coal fields in the mountainous districts, but are waiting proper transportation facilities for their profitable exploitation.

The regulations heretofore in force governing shipments of coal and coke to Scandinavia and Holland have been rescinded and W. T. B. R. 735, issued May

Exports of Coal and Coke During May, 1919

(Compiled by Bureau of Foreign and Domestic Commerce)

Districts:	Anthracite Tons	Bituminous Tons	Coke Tons
Maine and New Hampshire.....	133	.....	79
Vermont.....	1,163	860	.....
Massachusetts.....	142	.....	.....
St. Lawrence.....	124,515	139,084	492
Rochester.....	75,461	25,894	.....
Buffalo.....	187,598	179,866	9,668
New York.....	3,601	540	626
Philadelphia.....	820	18,552	.....
Maryland.....	.....	74,410	4,619
Virginia.....	.....	217,397	.....
South Carolina.....	.....	12,942	.....
Georgia.....	.....	3,780	.....
Florida.....	.....	6,374	.....
New Orleans.....	99	983	50
San Antonio.....	.....	575	2,350
El Paso.....	.....	4,429	2,405
Arizona.....	94	1,525	8,606
Southern California.....	2	74	.....
Washington.....	.....	25	29
Hawaii.....	.....	5	.....
Dakota.....	494	2,289	64
Duluth and Superior.....	210	420	26
Michigan.....	77	89,971	3,946
Ohio.....	4,481	649,617	339
Total.....	398,890	1,429,612	33,299

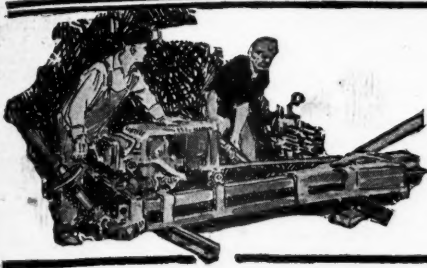
Countries:	Anthracite Tons	Bituminous Tons	Coke Tons
France.....	35,908	405
Italy.....	4,272	.....
Netherlands.....	6,300	.....
Norway.....	50	.....
Spain.....	22,792	1,611
Sweden.....	6,989	.....
Switzerland.....	820	2,062	.....
Bermuda.....	2	.....
British Honduras.....	396,580	1,088,026
Canada.....	1,717	14,643
Costa Rica.....	47	3
Guatemala.....	1,637	.....
Honduras.....	347	.....
Nicaragua.....	195	6,810	13,501
Mexico.....	325	.....
Newfoundland and Labrador.....	23	3,020	.....
Barbados.....	2,491	.....
Jamaica.....	1,594	.....
Trinidad and Tobago.....	3,039	.....
Other British West Indies	90,112	.....
Cuba.....	295	.....
Danish West Indies.....	7
French West Indies.....	589	1,475	20
Dominican Republic.....	22,589	4
Argentina.....	352	109,868	3,048
Brazil.....	4,931	.....
Chile.....	1	.....
Colombia.....	5	.....
British Guiana.....	27
Peru.....	8,362	.....
Uruguay.....	10	30
Venezuela.....	5	.....
Other British Oceania.....
Total.....	398,890	1,429,612	33,299

Districts:	BUNKER COAL Tons
Maryland.....	45,296
New York.....	298,991
Philadelphia.....	38,198
Virginia.....	141,275

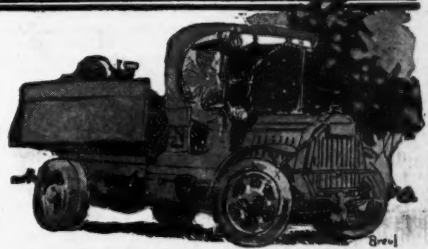
14, 1919, has been revoked. Accordingly, coal and coke may now be exported freely without individual license under the terms of Special Export License R C-77, as amended, effective July 14, 1919, to all the countries therein mentioned.

Exporters of coal see increased demand for coals now that prices for English fuel have been advanced six shillings per ton, but they cannot see where it is to be obtained unless there is a big increase in production, and that seems impossible under present labor conditions. Then again it must be remembered that domestic consumption will increase, with a larger tonnage being demanded by the steel and other industries.

A special cable dispatch to the Philadelphia *Ledger* states that about 150,000 tons of American coal have been discharged during the first half of July at Rotterdam alone, being carried along the Rhine in barges. American coal is being sold at European ports at \$30 to \$33 a ton. There is virtually a fuel famine all over Europe, and owing to unavoidable and other causes, it is estimated that English exports will for some time to come amount to only about 50 per cent. of the total sold abroad in 1913-14.



COAL AND COKE NEWS



Harrisburg, Penn.

Action by Governor William C. Sprout upon the Smith Bill, establishing a bureau of rehabilitation for persons injured in industry is expected this month and steps to begin the survey required by the provisions of the bill will be taken immediately by the State Department of Labor. The new bureau will be under that department and the idea is to supplement first the information gained in the last two years relative to the character and number of injuries in various industries, including coal mines and, second, the experience of the State Workmen's Compensation Board, by new surveys which will include the periods of greatest activity during the war. The benefit of the bill is limited to persons residing in this state and injured in Pennsylvania industries, and provides for special training to fit men for various occupations where their disabilities would unfit them for work.

The recent enforcement of the statute prohibiting the employment of boys under 16 years of age in anthracite breakers, is proving a boon to old men. As several hundred boys have been laid off, there is a marked shortage of slate pickers, jig operators, chute tenders and oilers. To fill the places made vacant by the boys, under the legal age, the companies have found it necessary to take on men well advanced in years. The aged men are now able to earn from \$12 to \$16 per week, greater compensation than received six years ago for mining coal.

Charleston, W. Va.

Ground lost during the week of the Fourth had been to some extent regained by July 12 though not to as great an extent as would have been the case had miners shown a little more celerity in returning to duty after their holiday. The second week of the month was about half over before there was anything like a full complement of miners in any mine and while production was in excess of that for the previous week it was still short of the final week of June. If the mines in the central southern section of the state did not reach the maximum production it was more because of labor shortage than due to any lack of cars, for empties furnished to the mines were entirely sufficient for all loading purposes. In addition to labor shortage an embargo still in force on July 17 on shipments from the high volatile fields to tidewater was instrumental in retarding a large production; the embargo, however, did not interfere with the shipments of smokeless coal to tidewater.

What was giving smokeless producers more concern than anything else was the navy requisitioning order which threatens, if carried out to the letter, to cause a shortage of smokeless coal in the markets. At the present time it is impossible to secure West Virginia smokeless coal in all markets, because of the heavy shipment of such coal to tidewater ports for export in an effort to make up for the deficit brought about in June by the Norfolk & Western tieup. Furthermore, during the week New River was showing further advances in price and was quoted at \$6.00 a ton at tidewater. It is estimated that the amount of coal produced in this section the latter part of the week brought the output up to about 70 per cent. in the Kanawha and New River fields.

There was a much increased demand for steam coal during the week, but little of such coal was being sold under contract, producers being unwilling to tie themselves up in contracts and buyers postponing definite action in the hope that they might be able to secure better prices later on in the season. With an improved demand for mine-run, slack is not so sluggish as it was, that condition being due in part to renewed activities at cement plants in the east. The second week of July also brought a better demand for byproduct coal as well

as for splint lump for domestic purposes. Despite the fact that prices for mine-run have advanced, a large number of producers are still slow about resuming operations, especially those whose mines have no screening equipment.

There were three reasons for an even greater call for New River smokeless during the first half of July than in previous weeks. In the first place there was a shortage of smokeless delivered at tidewater; then the holiday of the first week of July had shortened the supply mined and shipped, and finally there was an even more pronounced demand from foreign buyers. Lack of agreement as to the new wage scale is tending to create a spirit of indifference in the field which of course is having its effect on production. There have been further advances in New River smokeless and the price of that coal at tidewater now is \$6.00 a ton. A small proportion of the total production of the field is going to western markets.

There was a gradual improvement in the labor situation in the Kanawha district during the week ended July 12, although a shortage of miners following the July Fourth holiday apparently extended over into the following week. By speeding up operations during the latter part of the week it was found possible to get out a tonnage equal to about 70 per cent. of capacity or some 140,000 tons. The run of empties throughout the week was entirely satisfactory. Increased demand for coals which have been rather inactive was also in evidence, more especially steam coal, it being apparent that industrial consumers were beginning to realize the necessity of arranging for a supply of fuel for present and future needs. Nevertheless large buyers are somewhat backward about contracting for a future supply. Producers apparently are content to rest on their oars and await developments before entering into contracts, believing that prices will reach a much higher level. There is a better market both in the East and in the West for mine-run and slack steam coal, though eastern markets are consuming much the larger quantity of such coal. Sales of domestic splint lump are also heavier. Gas and byproducts are also in more regular demand just at present. Production in the district would have been somewhat heavier but for the tidewater embargo already referred to.

Fairmont, W. Va.

All conditions in the Fairmont and other fields in northern West Virginia were conducive to heavy mining, loading and shipment of coal from such fields throughout the week ending July 12, up until the last day or two of the week when shipments slumped somewhat. In fact during the first three days of the week more coal was mined and shipped at least from some parts of northern West Virginia than at any time during 1919. During this time loading out of the Fairmont field was over 1100 cars a day. This was made possible not only by a sustained supply of cars and reasonably prompt placements, but also to an enlarged market for northern West Virginia coal, especially among the larger industrial concerns of the East, steam, mine-run and slack benefiting by the increased demand. While that kind of coal was also moving to western markets in somewhat larger quantities than during earlier weeks, yet the volume was far from being as large as eastern shipments, the western market being somewhat more sporadic. Increasing shipments to Curtis Bay reflected a somewhat heavier export business than had been obtained in earlier weeks, although such business has been steadily growing during the last month or two. The early part of the second week of July also brought further orders for Lake shipment so that shipments to Lake ports increased in volume though still far below what used to be considered normal. There is not much prospect of an extensive development of Lake business, however,

until there is heavier consumption at upper Lake docks and until there is some adjustment of present rates. The car supply on the last day of the week was somewhat short, but it was believed that by the following Monday there would be an ample supply on hand. A few mines found it necessary to shut down because of such a shortage. With an enlarged market for coal however, the number of idle mines had been much reduced.

Williamson, W. Va.

Ground lost during the week of July 5, when production in the Pocahontas field dropped to 237,000 tons, was completely regained during the following week when production reached 342,000 tons—another high level. This gain of 105,000 tons was attributable to longer working hours and an increased number of miners at work, the number of hours worked having been increased from 3147 to 4248. Production rapidly increasing, production losses were cut down until they were almost negligible; amounting in all to only 37,651 tons or about half the loss of the previous week. There was a slight increase in the car shortage loss while, on the other hand, there was a material reduction in the labor shortage loss from 46,000 to 16,000 tons. Mine disability losses were doubled, but those from other causes were wiped out altogether. It is simply a question of mining, loading, and transporting Pocahontas coal now since the market is more than sufficient to absorb the entire output. Coke production showed a gain during the week, being 7690 tons—still far below normal.

Serious interruption to coal transportation was one of the consequences of a heavy storm in southern West Virginia which washed out numerous stretches of track on the Virginian Ry., particularly between Mullens and Maben, in one place 2500 ft. of track being washed away. The numerous washouts made it, of course, impossible to operate coal trains between Deepwater (the junction point with the Chesapeake & Ohio and the Virginian) and Mullens. On the main line of the Virginian Ry. several days elapsed before trains could be operated and, consequently, the mines along the line were unable to load and ship their customary tonnage of coal.

Hinton, W. Va.

An important meeting was held at White Sulphur Springs on July 12 at which time the order of Secretary Daniels commandeering smokeless fuel was debated at great length by the smokeless operators of West Virginia. Almost unanimous opposition to such commandeering was expressed but no definite stand was taken, as a body, beyond requesting those representing West Virginia in the Senate and House at Washington to arrange if possible for an interview between the Secretary of the Navy and the smokeless producers. If such a conference is held, these operators will seek to have the commandeering order rescinded; failing in that they will at least endeavor to have the amount of coal to be requisitioned cut down. However, smokeless producers do not appear to be sanguine of inducing naval authorities to abandon their intention of requisitioning coal at \$2.75 a ton which is much below current quotations. Districts represented at the meetings were the New River, Pocahontas, Tug River and Winding Gulf. Col. T. E. Houston presided at the meeting.

Logan, W. Va.

A gain of 78,000 tons was made by the mines of the Logan field during the week ended July 12 over the previous week, production reaching the new high level for the year—248,000 tons—the production for the previous week having been 170,000 tons. The output for the week of the twelfth was only 5000 tons below that of the corresponding period for 1918 when

production reached 253,000 tons. Though it was still found next to impossible to secure all the miners needed, the large output was made possible through the number of hours worked—5056 as against 3461 for the week ended July 12. Logan district is now producing up to 85 per cent. of capacity. Transportation facilities were better than at any time this year, as shown by the fact that there was only about one per cent. car shortage loss running to 2972 tons, as compared to a loss of 10,000 tons for the preceding week. That labor conditions in the district had undergone marked improvement in the course of a week was shown by the reduction in the labor shortage loss from 33,000 tons to 14,000 tons, or from 14 to 5 per cent.

Tidewater ports were still closed to gas coal by an embargo applying to coal mined in the Logan district as well as other districts supplied by the Chesapeake & Ohio Ry. during the week ended July 12 and also throughout the week ended July 19.

In coal loading for June the Logan district had a higher average of performance than any other field supplied by the Chesapeake & Ohio Ry., the performance being 91.4 per cent. of allotment, Kentucky ranking next with 90.4 per cent. The percentages of other fields were as follows: New River 82, Kanawha 89, Coal River 85.

The prospects are that unless there is some unforeseen change in conditions, that July will eclipse June in production in the Logan field.

The best coal loading record for the year 1918 has been shattered by the Chesapeake & Ohio during the week ended July 12. In 1918 coal loading was accelerated to an unprecedented degree by war demands, but the week ended July 12 beat even these records on the Chesapeake & Ohio.

Muskogee, Okla.

Texas, Arkansas and Oklahoma coal operators are much concerned over the competition of cheap Mexican crude oil as fuel, and are seeking means for eliminating this competition. Their business is threatened, they assert, and that unless protection is afforded, many of them must face bankruptcy.

This question was slated for discussion at the recent meeting of the Oklahoma Coal Producers' Association at Muskogee, Okla.; but after the convention assembled it was disclosed that the subject had not been submitted in the call sent out by the secretary, as required under the by-laws, and the subject could not be officially considered. It was discussed informally by the operators who attended the meeting, but action was deferred and it was decided to call another meeting to assemble at McAlester, Okla., on July 28. At that meeting, under the call already sent out, the question of affiliation with the National Coal Operators' Association, and a resolution recommending a tariff on Mexican crude oil will be acted upon.

Coal operators declare that Mexican crude oil is delivered at the border for 65c. a barrel, which is less than the freight charges from this section to the border on a quarter of a ton of coal, the equivalent of a barrel of crude oil in heat units. By affiliation with the National association it is hoped to line up the membership of this organization in favor of the proposed tariff for protection of the coal operators. Mexican fuel is now robbing the coal operators of a large trade territory in the Southwest.

PENNSYLVANIA

Anthracite

Shenandoah—Several hundred boys less than 16 years of age were discharged in the early part of July in four collieries in the lower anthracite region in accordance with the law which became effective July 1. The law is said to be unpopular among officials and employees alike. In the case of the former it means the companies must dispense with some desirable help, while in the latter, it works a hardship in many instances. In a number of cases boys were discharged who were the sole support of dependents.

Shamokin—Complying with legislation recently enacted prohibiting the employment of boys under 16 years of age about the mines, the Philadelphia & Reading Coal and Iron Co. and the Susquehanna Collieries Co., on July 7, discharged between 300 and 400 youths.

Bernice—The Connell Anthracite Mining Co., operating at this place, has provided a new recreation park for its employees and their families. The company developed a section of mountain land fitting up a dance pavilion, kitchen, dining room and

recreation features. The park is lighted with electricity, a place is provided in which to park cars and it is generally made a real pleasure resort.

Seranton—There is a persistent report to the effect that the Leggetts Creek colliery of the Hudson Coal Co. was purchased by a syndicate of Boston and Cleveland capitalists on July 15. The syndicate is headed by J. P. Burton, of Cleveland, Ohio, president of the Trevorton Colliery Co. S. Hartwell, president of the H. N. Hartwell Sons, wholesale and retail dealers of anthracite and bituminous coal in New England is also interested. The third member of the syndicate is Philip Salonshtall, banker, of New York and Boston. It is said to be the plan of the new owners of the colliery to begin remodeling the breaker at once so that it will be capable of handling between 2500 and 3000 tons of coal a day. It is estimated that the amount of minable coal on this property is 13,000,000 tons. The Leggetts Creek colliery has been in litigation for a number of years, and recently a verdict was rendered in favor of the landowners, which provided that the company would have to forfeit the lease.

Bituminous

Sharon—The Diamond No. 3 mine owned by the Westernman-Filer Co., of this place, was sold recently to the Scotch Hill Coal Co., of Pittsburgh. This mine has been in operation for the past 11 years and has a capacity of 600 to 800 tons a day.

Midland—The Crucible Steel Co., of Pittsburgh, is constructing a byproduct plant at this place which will have a capacity for carbonizing nearly 2000 tons of coal per day, producing more than 1300 tons of coke daily. The completion of this plant will mean another outlet for Monongahela River coal which will be supplied from mines at Crucible in the sixth pool.

Unlontown—There seems to be somewhat of a slump in the coke business in the Connellsville region during the week ended July 19. Several plants are carrying a large number of unconsigned loads and some are having to resort to off days. This may be due to the fact that some furnaces are stocked up and holding off for better prices. The Republic coke plant of the Republic Iron and Steel Co. was handicapped early in the week by its tracks being flooded by heavy rains.

Chambersville—The Seneca Coal Mining Co., of Buffalo, N. Y., operating the Seneca No. 1 mine here, has purchased the operation of the Shannon Coal Company whose mine is directly opposite the Seneca No. 1 tipple. The output of the Shannon mine has been loaded over the Seneca tipple for the past several months, but with the new property the Seneca company plans for a much larger tonnage. The Shannon mine is being equipped with electric mining machines and haulage locomotives. A larger bridge now spans the creek so as to accommodate the large electric locomotives and the increased tonnage. The plan is to double the present loading of the Seneca tipple.

Washington—H. A. Davis, of Pittsburgh, president and treasurer of the Canonsburg Gas Coal Co., announced on July 12 the organization of the Washington Gas Coal Co. This new company was promoted by the Canonsburg company in conjunction with practically every industry in the Washington district with a capitalization of \$500,000. The company has paid \$250,000 for about 600 acres of coal land north of this place for immediate development. The new mine is to be developed by a 280-ft. shaft and a slope 1000 ft. long; it is to be electrically equipped. The unique feature of this plant is to be the transportation of the product of the mine to local industries without railroad haulage, by means of trucks direct from mine to consumer. The officers of this company are: H. A. Davis, president; J. H. Hillman, Jr., of Pittsburgh, vice president; and R. G. Luton, of Washington, secretary. Mr. Hillman is chairman of the board of the Hillman Coal and Coke Co., the Hecla Coal and Coke Co. and the Thompson Connellsville Coke Co.; he is also interested in other coal and coke operations.

WEST VIRGINIA

Moundsville—Preliminary construction work on the plant of the Woodale Coal Co., recently organized with a capital of \$400,000, is being pushed. A shaft will be sunk at the mouth of Fish Creek in Marshall County. The company will build 50 houses at once for the accommodation of those opening up the mine.

Logan—Construction work on the new plant of the Brush Creek Coal Mining Co.

located at Costa, W. Va., having been completed, the company has begun the mining and shipment of coal from its two mines, at the rate of two cars a day. The president of the company, H. C. Jones, of Logan, is also in charge of coal sales.

Kimball—Six men are said to have been killed in a gas explosion at the mine of the Houston Collieries Co. here on July 18. From 100 to 200 men were in the mine at the time but the six men killed were the only ones seriously affected by the explosion. The cause of the accident is a mystery. This mine is a few miles east of Welch and the development is by shaft on the Pocahontas seam.

Wheeling—Crews engaged in fighting the fire in the Beach Bottom mine of the Richmond Block Coal Co., near this city, succeeded in finally gaining control over the flames. Heavy damage resulted to the mine. The chief of the Department of Mines of West Virginia, W. J. Heatherman, supervised the final effort made to put out the fire. Temporary repairs were started as soon as the fire was extinguished and little delay will be experienced in resuming coal shipments.

Fairmont—Several companies in northern West Virginia whose coke plants have not been utilized for some time have fired up their ovens again and are beginning to ship coke to market. Among the companies who are producing coke again is the Jamison Coal and Coke Co., the operation of its No. 9 plant at Barracksville having been resumed. While so far coke shipments have been exceedingly light, a larger demand is confidently expected.

Glen White—Five hundred veterans of the war, just back from France, and 5000 of Raleigh County citizens were present at the dedication of a bronze memorial tablet inlaid in a stone monument erected by the employees of the E. E. White Coal Co., at this place, in honor of their fellow workers of the company's Glen White and Stotesbury operations, who offered their lives for the defense of their country. The unveiling of this memorial was the feature of this Fourth of July program that included speeches, music, athletic sports and a monster family basket picnic. In the evening there was dancing in the white and colored amusement halls.

KENTUCKY

Middlesboro—The tipple of the Lower Lignite Coal and Mining Co., of this place, burned down recently. The fire is supposed to be of incendiary origin and the loss is stated to be \$5000. Several loaded gondolas were also destroyed.

OHIO

Martins Ferry—The Lorain Coal and Dock Co., has closed a deal with the McComas estate, whereby the company gains possession of the Brockumer Estate at Wheeling Creek; \$100,000 is said to have been paid for 400 acres of coal land.

Toledo—More activity has developed at the Toledo docks of the principal coal carrying roads. During the week ended July 12 the Toledo & Ohio Central docks loaded 74,262 tons as compared with 37,783 tons the previous week, making a total of 584,204 tons for the season. During the same week the Hocking Valley docks loaded 211,006 tons as compared with 146,840 tons the previous week, making a total of 2,050,480 tons for the season.

Columbus—The organization of the Great Lakes and Ohio River Waterways Association, which has for its object the connecting of the Ohio River with Lake Erie by barge canal was completed at a meeting held here recently. The association is striving to show the many advantages of the so-called central route which runs through Columbus and joins the two waterways at Portsmouth and Port Clinton. Henry A. Williams, president of the Columbus Chamber of Commerce, is president of the organization, and J. T. Daniels is secretary. The Columbus Chamber of Commerce is lined up strongly behind the project. The sum of \$250,000 has been appropriated by Congress for a survey.

MARYLAND

Cumberland—The Cumberland division of the Baltimore & Ohio R.R. is now handling coal at the rate of about 2000 cars a day and has been almost continuously since July 7. Loads from the northern West Virginia division are the heaviest, having averaged in excess of 1100 cars a day; the Connellsville and Somerset fields contributing about 600 cars a day; while loads from the Georges Creek region have been averaging approximately 400 cars a

day. The prospects are that the tonnage of coal handled will increase as the season progresses unless a car shortage should intervene.

OKLAHOMA

Alderson—The Rock Island Coal Mining Co. has resumed the operation of its mine at this place, in which an explosion killed fifteen men a short time ago. The State Mine Inspector of Oklahoma issued orders prohibiting the mine from being opened for operation for a period of ten days. During this time he searched diligently for gas which might have caused the explosion, but was unable to find any. The cause of this explosion remains a mystery; tests on the day before the explosion failed to show any gas whatsoever and immediately after the rescue work, tests made failed to show the presence of gas. Yet the condition of the men's bodies showed that death had been caused by a slow combustion that had exhausted the oxygen supply, as no bruises of any kind were disclosed.

INDIANA

Terre Haute—Coal production in Indiana for 1919 has fallen far below that of 1918, according to figures published by the Indiana Bituminous Coal Operators' Association. These figures disclosed the fact that during the first six months of the present year the production from the coal mines in the state has been less by more than 5,000,000 tons than the tonnage of the first six months of 1918. The production to the first half of the present year was a little over 9,000,000 tons. The June production figures were 1,355,551 tons as against 1,307,325 tons in May.

ILLINOIS

Belleville—The new National Coal and Mining Co. has elected the following officers: President, A. L. Wright; vice president, August Herl; secretary, John H. Wright; treasurer, Anderson Wright; board of directors, B. O. Schull, Ernest G. Fey, William Kunze, Victor Geolat; trustees of compensation fund, August Herl, Charles Pointon and Theodore Kunze.

Carlinville—The Sinclair Coal Co., of Texas, which some time ago closed a deal for over 12,000 acres of coal rights southwest of this place began payment on this property recently. The company plans to enter the coal field here at once. Carlinville is in the center of one of the prominent coal fields of Illinois and the city is experiencing a most rapid and substantial growth. The Standard Oil Co. has large interests in this section which are developing on an extensive scale.

Hartland—The increased demand for coal following a period of inactivity has enabled at least three companies operating in this section to resume operation. These companies are the Mill Creek Coal Co., the Mid-Lothian-Jewell Coal Co. and the Federal Coal Co.

The French Colliery Co. is preparing to develop the tract of 430 acres of coal land which it purchased not long ago from the Hartland Collieries Co. near here, and expects in a comparatively short time to have a mine in operation.

Duquoin—The coal industry in this section of the country at the present time, is facing a serious car shortage which has been gradually growing worse until now many of the large mines are losing from 2 to 3 days per week. Many tons of coal have remained in the ground in the last three weeks, because several of the large mines around Duquoin have been forced to remain idle whereas they would have worked had they been able to secure cars to load. It is unusually early for a car shortage to start at this time of year but the railroads say that part of the cause is due to so much unbilled coal which is standing on sidetracks in many mining centers.

UTAH

Echo City—A partly developed coal mine about 31 miles south of this place and near the Union Pacific Coalville line was opened up by J. H. Dowdell. It is now the intention of G. P. A. Weisenborne, an eastern manufacturer, to become interested in this property, with Mr. Dowdell, to incorporate under the name of the Lux Coal and Mining Co., push further development and have the mine in full operation within a short time. The present holdings of this company comprise some 80 acres but it is expected to double this territory.

COLORADO

Grand Junction—The Midwest Coal Co., with general offices at Palisade, has about completed the suspension bridge across

Grand River. The bridge extends from the mines to the loading track, a distance of 400 ft. It has a double roadbed and is supported by flat steel cables. It is one of the larger and more extensive improvements of the company this season.

Denver—Preparatory steps are being taken to contribute to the success of the National first-aid mine-rescue tournament to be conducted by the Bureau of Mines, in Pittsburgh, on September 30 and October 1. In this connection announcement was made recently that Bureau of Mines rescue car No. 11, which arrived here during the convention of the Rocky Mountain Coal Mining Institute, had been assigned to the Utah and southern field indefinitely. Work in first-aid and mine-rescue training will begin at once beginning in the Cottonwoods district. Other mining camps of the state will be visited by the car later. The staff of the car consists of Richard V. Ageton, engineer in charge; K. T. Sparks, foreman miner; Donald W. Cook, first-aid miner, and J. P. Allen, clerk.

MONTANA

Melstone—A coal mine is to be opened in the Carpenter Creek field south of here in the near future according to C. B. Foncannon of Aberdeen, S. D., who has extensive land holdings in that field. Two workable seams of coal under the Foncannon holdings, both of which outcrop on the north side. One of the beds is seven feet thick at the outcropping and increases to a thickness of eight feet. The physical features of the property are such as to make the driving of a slope practical and comparatively inexpensive.

Personals

T. E. Houston, heavily interested in a number of mines in the Pocahontas and Thacker coal fields of West Virginia, is stated to have insured his life for \$1,750,000. The announcement comes from Mr. Houston's sales office in Cincinnati, Ohio, and is to the effect that of the amount of the insurance, \$500,000 is for the protection of his family and estate; the remaining \$1,250,000 is for the benefit of the corporations, of which Mr. Houston is the head.

F. M. Chase, vice president of the Lehigh Valley Coal Co., with headquarters at Wilkes-Barre, Penn., gave his customary annual dinner and reception to the staff of his organization at his home "Breezytop," on July 11. An added feature on this occasion was the fact that Mr. Chase is rounding out his fortieth year of service with the Lehigh Valley company. As showing how he had seen this company develop, Mr. Chase pointed to the fact that when he began as an office boy in 1879, the Lehigh Valley company operated only five collieries, producing in that year 675,000 tons; while during 1918, it operated 39 collieries and 21 breakers and the production was 9,309,000 tons.

Delos W. Cooke, former Fuel Administrator for New York, now associate director of the Cunard Line, had conferred upon him by the French Government the title of Chevalier of the Legion of Honor. This is in recognition of Mr. Cooke's services to France as Executive Control of the Traffic of the Allies, having charge of the movement of supplies during the war and representing them on the Exports Control Committee at Washington. In addition to this Mr. Cooke had charge of the transportation arrangements for the American Red Cross at Washington on the staff of H. P. Davison, Chairman of the War Council. Previous to becoming Fuel Administrator Mr. Cooke was a vice president of the Erie railroad.

Coming Meetings

The Bureau of Mines on Sept. 30 and Oct. 1 will hold a national first-aid and mine-rescue contest at Pittsburgh, Penn.

New York Coal Merchants' Association will hold its annual meeting Sept. 11-13 at Alexandria Bay, N. Y. Executive secretary, G. W. F. Woodside, Albany, N. Y.

American Institute of Mining and Metallurgical Engineers will hold its fall meeting Sept. 22 to 26 in Chicago, Ill. Chairman Chicago meeting, Carl Scholz, 547 West Jackson Boulevard, Chicago, Ill.

The National Commissary Managers' Association will hold its annual meeting August 5-7 at the Sinton Hotel, Cincinnati, Ohio. Secretary, D. J. Elchoff, Manhattan Building, Chicago, Ill.

Pennsylvania Retail Coal Merchants' Association will hold its annual meeting July 23 and 24 at Reading, Penn. Secretary, W. M. Berolet, Reading, Penn.

National Exposition of Chemical Industries will hold its fifth annual meeting at the Colliseum and First Regiment Armory, Chicago, Ill., during the week of Sept. 22. Manager, Charles F. Roth, 417 South Dearborn St., Chicago, Ill.

The National Safety Council will hold its annual meeting Oct. 1 to 4 at Cleveland, Ohio. Secretary, S. J. Williams, Chicago, Ill.

Oklahoma Coal Operators' Association will hold its next meeting July 25 at McAlester, Oklahoma. Secretary, F. F. La Grave, McAlester, Oklahoma.

Obituary

Dr. C. H. Austin, surgeon for the Sunny-side Coal Co., at Strong, Colo., who went on a fishing trip with two Mexicans recently, was shot twice and beaten with a gun; he died in a hospital at Pueblo, as a result of his injuries.

Oscar Otto died on June 30 as a result of injuries received in an automobile accident. He was general superintendent of the South Philadelphia machine works of the Westinghouse Electric and Manufacturing Co.

Albert H. Tracy, Jr., president of the Retail Coal Association, of Buffalo, died on July 17 at the age of 52 years. He had been in the coal business most of his active life and on the retirement of his father from the superintendency of the Delaware & Hudson Co.'s Lake docks, the two formed the Tracy Coal & Wood Co., which is still in successful operation. He was a widower without children.

Industrial News

Washington, D. C.—Recent movement of coal through the Panama Canal was as follows: steamship Claremont, Baltimore to Callao; steamship Cowboy, Newport News to Coquimbo; steamship Pensacola, Norfolk to San Francisco; steamship Borgland, Norfolk to San Francisco.

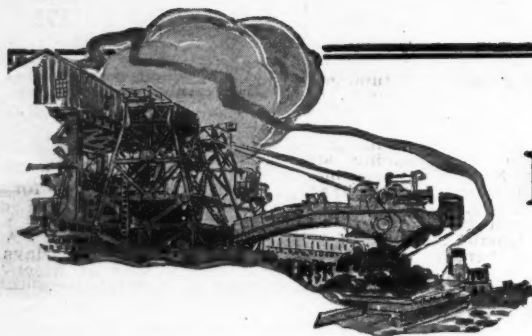
Troy, N. Y.—W. J. Rainey, 52 Vanderbilt Avenue, New York, is understood to be considering plans for the construction of a large new byproduct coke plant here, estimated to cost in excess of \$5,000,000. It is said that the contract for the installation of the ovens will be handled by the Koppers Co., Pittsburgh, Penn.

Washington, D. C.—The War Trade Board section of the Department of State announced July 16 that all agreements (W. T. B. Form X-201) entered into with the War Trade Board by persons, firms, or corporations in the United States and its possessions and in foreign countries, in connection with the sale or delivery of coal, coke, and primary or derivative oils, are canceled, effective July 14, 1919.

Ward, W. Va.—Handling and loading of coal from its various mines will be consolidated by the Kelly's Creek Colliery Co., of this place, having perfected arrangements for loading the products of the various mines on Kelly's Creek over one tippie. In all, it is said, \$250,000 will be expended in improvements during the summer. The general manager of the company is J. J. Smarr.

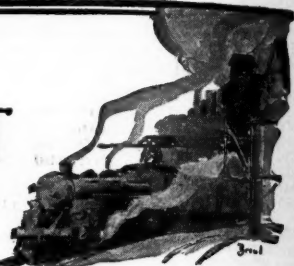
Logan, W. Va.—There will be further development of coal lands in Logan County following the organization of the Mabel Coal Co., of Mallory, which has a total authorized capital of \$150,000. It is not only the purpose of the company to produce coal but also to deal in coal lands. Active in the organization of the new company were Bruce McDonald, W. C. Turley, E. L. Hogsett, of Logan; J. W. Thornbury and F. M. Burgess of Man, W. Va.

Huntington, W. Va.—Mining operations will be started in the Guyandotte district of Cabell County by the Lake and Export Coal Corporation as soon as the plant can be constructed. The company also has in mind handling coal land, particularly in Kentucky and Ohio. The new concern has a capital of \$150,000. The company was organized by the following Huntington business men: C. L. Wells, E. L. Williams, A. Corn, Percy Williams and John S. Marcum.



MARKET DEPARTMENT

EDITED BY ALEX MOSS



Weekly Review

Bituminous Market Conditions Firmer, with Quality Grades Short of Supply—Labor Scarce and Unruly—Coal Carrying Equipment in Poor Condition—Anthracite Market Strong in Both Domestic and Steam

THOUGH conditions in the soft-coal market are distinctly better than they have been, no pronounced upward tendency in prices is discernible. However, it is difficult to procure the better grades of bituminous. Operators continue to urge dealers and consumers to lay in their stocks while the opportunity affords, as a fuel shortage late in the fall and during the winter can scarcely be avoided. New contracts for future requirements are not being entered into by the operators, who are contenting themselves with clearing up old orders and preparing for the demand, at higher prices, that is sure to come.

Mine labor is not only scarce, but what is more aggravating is the fact that workers in many of the fields producing the good grades of soft coal refuse to put in more than four days a week. The output of bituminous coal for the week ended July 12 is estimated at 10,169,000 net tons, making a total for the calendar year to date of 230,-

522,000 net tons, or approximately 77,600,000 net tons less than in the corresponding period of 1918.

The daily rate of production averages 1,695,000 net tons, which is about commensurate with the present rate of consumption. It is doubtful whether any increase in the daily output of soft coal can be made.

Another deterring factor to full-time operation in the bituminous mines is the shortage of coal-carrying equipment. Thousands of cars have been taken off the rails for repairs, thousands of others have been scrapped; and it is apparent that in some districts the number of disabled cars will have a pronounced effect upon mining. Some operators report that they were without cars for two successive days during the week under review.

The marine workers' strike is having a serious effect on coastwise coal shipments, and developments the next week or two will be awaited with much interest and some anxiety. The export

market is very firm, and, as is to be expected, Pocahontas and New River coals receive the preference. Quotations for these grades run from \$6 to \$6.25 per gross ton f.o.b. Norfolk and Newport News.

All the domestic sizes of anthracite continue to be in urgent request. Mines are operating as near full time as possible, though production, as in the bituminous region, is interfered with by a shortage of labor and the refusal of the miners to work steadily.

Steam sizes of anthracite are not causing so much trouble as might be expected, as shippers are not oversupplied owing to the closing down of many washeries. Prices are being adhered to generally, although the full schedule figures are being shaded.

The estimated production of anthracite in the week ended July 12 was 1,874,000 net tons, bringing the total production for the calendar year to date to 47,078,000 net tons, or 10,870,000 net tons less than last year.

WEEKLY COAL PRODUCTION

The production of bituminous coal in the week ended July 12 is estimated at 10,619,000 net tons, an average per day of 1,695,000 tons, compared with an average of 1,492,000 tons for the five working days in the previous week, and compared with 2,214,000 tons in the week ended July 13, 1918. The production for the calendar year to date is 230,522,000 tons, or approximately 77,600,000 tons less than in the corresponding period last year. The average daily production, considering only working days, has been about 500,000 tons less this year than last year.

The estimated production of anthracite in the week ended July 12 was 1,874,000 net tons, compared with 2,136,000 tons in the corresponding week last year, and the average daily production in the week ended July 12 was 312,000 tons, compared with 282,000 tons in the previous week and 356,000 tons in the corresponding week last year. The production of anthracite to date is estimated at 47,078,000 tons, or 10,870,000 tons less than in the corresponding period last year.

Returns from the operators for the week ended July 5 record a further improvement in market conditions, the loss of time on account of "no market" averaging 24.3 per cent. of full time in the week, compared with 72.5 per cent. in the week ended June 28, and more than 32 per cent. in the first half of June. Market conditions in Illinois and Indiana were better, and the Hazard, Kentucky and Westmoreland (Pennsylvania) districts recorded notable improvements. Less than 4 per cent. of the full-time operation was lost because of "no market" in western Pennsylvania, less than 1 per cent. in the Westmoreland and neighboring fields, and central Pennsylvania showed an improvement. Car supply was better in the week ended July 5 than in

the previous week in all districts except Illinois, Indiana, southern Ohio and central Pennsylvania, while losses due to shortage of labor increased in every district save southern Ohio and Alabama.

The production of beehive coke in the week ended July 12 is estimated at 325,648 net tons, compared with 680,000 tons in the week ended July 13, 1918, and with 264,328 tons in the five-day week of July 5, 1919. The production of beehive coke to date is estimated at 10,197,481 net tons, as against 16,412,818 tons in the corresponding period of last year.

Bituminous coal dumped at lower Lake Erie ports in the week ended July 5 was 923,939 net tons, compared with 994,901 tons in the week ended June 28, and 861,093 tons in the first week of July, 1918. The total lake coal dumped from Jan. 1, to July 5, 1919, was 10,053,441 tons, compared with 8,560,516 tons in the corresponding period, last year.

BUSINESS OPINIONS

Dry Goods Economist.—Inquiry among large distributors revealed the opinion that stocks of many lines of goods in the hands of retailers are much depleted, and that replacements must be made as soon as possible in order that when the fall openings occur in September it will be possible for retailers to show reasonably fair assortments of goods.

The Iron Age.—All the week's iron and steel trade developments are favorable, with indications of sustained if not cumulative activity throughout the summer. In the Pittsburgh district operations are on a larger scale, the Carnegie Steel Co. having 75 to 80 per cent. of ingot capacity active, while a large independent interest there is above 80 per cent. A broadening inquiry from all parts of the globe marks the export market. Buyers are slow to accept

the belief here in the stability of prices, but the volume of contracting is sufficiently large to indicate there is no summer-time dullness in foreign trade. Tin plate is now reckoned in export activity. A Pittsburgh mill has booked fully 20,000 boxes for Japan and much more is under negotiation.

Marshall Field & Co.—Current wholesale distributions of dry goods was considerably in excess of the large figures of the same week last year. The total of orders from road salesmen for both immediate and future delivery was also greater for the comparative period. Business in the house for this time of year has been brisk, more merchants coming into market than during the corresponding period of 1918. Retail trade continues excellent. Collections are good.

American Wool and Cotton Reporter.—The condition of the Boston wool market is strong and advancing. In the West wools are pretty largely bought up. Fine wools are high but are becoming exhausted. Medium wools are expected to be called for more before long and in fact they are more in demand even now. It is expected that by another month there will be a good-sized boom in the lower grades of wool. In cotton the situation is causing an increasing amount of interest. It is only a question of time when cotton will be needed in much larger quantities by foreign manufacturing concerns.

Atlantic Seaboard

BOSTON

Market firmer and prices advancing, but as yet no pronounced upward swing. Shipments light due to labor conditions. Short-

age of cars already a factor. Only scattered buying. Railroads try to increase deliveries. Coastwise trade almost at standstill because of marine strike. Hampton Roads coals rapidly being absorbed for export. Shortage of bituminous at Philadelphia piers opens way for anthracite sizes, but supply limited. Pea and buckwheat in better request.

Bituminous—While the market is distinctly firmer there has as yet been no pronounced upward swing in prices on the coals shipped all-rail. It is much more difficult, however, to buy the better grades. Of Navy standard coal from Pennsylvania there is practically no tonnage available. Shippers who are under obligation to furnish coal to the Navy Department are, many of them, in straits to furnish their quota and there is some buying on their part to cover in the grades that would be acceptable. Advances of 25c. have been rumored the past few days, but these are as yet unconfirmed.

Now that orders are in hand for full-time production it is apparent that nothing like full time can be expected from mine-workers. Four days is now the average for the thicker seam operations, and shippers are finding that where the men are pressed to work five and six days the daily output is diminished and doubts are expressed whether in most of the regions any great increase can be relied upon. This is the chief reason for faith in higher prices, for while demands have thus far kept in step with output it is realized that any change that makes for less output will restore a bull market.

The threatening shortage of cars is another strong factor. It has been said that upward of 50,000 coal cars have been shipped, and certainly it is apparent that in some districts, especially along the line of the B. & O., that the number of disabled cars will have a pronounced effect upon mining. The past week there were operations without cars for two successive days, the first time this year, and when that occurs in July it is ominous. It is rumored also that the central authorities have in view an order to return cars to regions where they are owned, and should this be carried out there is no question about the depressing effect it would have upon production in Pennsylvania. The Tidewater Coal Exchange is once more coming into prominence because of the changing conditions. Within a few days, for the first time in perhaps 10 months, receipts at certain of the piers have been less per day than the daily dumping, and this of course cannot continue indefinitely.

And yet in face of these conditions there is no buying response from New England, certainly not in any volume. There is scattered inquiry for coal, but buyers are still in position to be discriminating as to grade and price and few if any current sales will stand more than one commission. Purchases made now are not for current use, and what anxiety there is among steam-users is for consumption next fall and winter, in anticipation of more difficult conditions. Offerings of coal are still being turned down quite as often as possible orders, and so far as New England is concerned we have yet to see an active market.

The strike of marine-workers has been effective on practically every steamer carrying coal coastwise, and on most of the tugs, both coastwise and harbor. Several of the barge lines have been affected through having no power to tow them. The offer of the Shipping Board was not accepted by the unions, and at recent conferences no headway seems to have been made.

Current quotations on bituminous at wholesale range about as follows:

	Clearfields	Cambrias and Somersets
F.o.b. mines, net tons....	\$2.35@2.80	\$2.80@3.40
F.o.b. Philadelphia, gross tons.....	4.49@5.00	5.00@5.70
F.o.b. New York, gross tons.....	4.85@5.35	5.35@6.10
Alongside Boston (water coal), gross tons.....	6.35@7.05	6.85@7.50
Georges Creek is still quoted at \$3.70 per net ton f.o.b. mines.		

Pocahontas and New River are being quoted at \$6.00@6.25 per gross ton f.o.b. Norfolk and Newport News, Va., in response to export demand. There are practically no spot sales for coastwise shipment.

The Hampton Roads situation shows more activity than do the coals all-rail or from the other ports. The export market is very firm, and certainly there is no dearth of inquiry; \$6.25 is now a regular figure f.o.b. vessel, while many of the

agencies have contracts in New England that net them \$4.69. This difference measures the premium that is being offered to get spot cargoes afloat for oversea shipment. Slow loading has also been a feature, and no coal is being sold in this market from Norfolk or Newport News without an understanding as to steamer demurrage. It is natural that Pocahontas and New River should have the call in foreign markets, and should this demand develop along the lines now expected there would be great difficulty in New England getting anything like even the modest quota that was relied upon early this season.

Anthracite—Egg, stove and chestnut are still in extremely short supply at all the loading piers. For several days there has been an effort to increase the Tidewater movement by diverting from all-rail territory, but actual shipments are far behind the wants of retail dealers in New England. The shortage of bituminous at the Philadelphia piers because of light output during the holidays has for the time being opened the way for better anthracite loading. Barges that would have loaded bituminous in regular course have been allowed to load anthracite for that reason, although the shippers have been hard put to it to furnish cargoes. Pea and buckwheat have both been loaded in the effort to use the barges available.

All-rail movement of domestic sizes shows no appreciable improvement. Companies who have been the largest distributors have been obliged to curtail shipments, especially to new trade, and there is increasing anxiety over the outlook. Prices of "independent" coal have been quoted within a day or two at \$1.35@1.75 in excess of the regular company circular.

NEW YORK

Domestic sizes of anthracite scarcer, with stove and egg in heavy demand. Production is fair with little chance for improvement. The line trade buying heavily. High premiums for quick shipments reported as offered. Steam coals easier. High grades of bituminous scarcer. Quotations for nearly all grades show strength over last week. Shipping strike hits bunkering trade. Increasing call for exports.

Anthracite—Every one of the domestic coals continues to be in heavy demand, with the majority of the loading docks practically bare of those sizes. This is particularly true of the docks on the west side of the North River, and it is also said that these docks are also short of the steam coals. There are large tonnages of steam-coals at the lower docks, but scarcely any of the larger sizes. That the market is not oversupplied with the steam coals is due to the closing down of many washeries.

There has been no increase in the receipts, which continue to be far too small to meet the requirements of the trade. Both the larger companies and independent operators are endeavoring to make an equitable distribution of their products. There have been heavy shipments to Canada, where the demand is heavy. Dealers from New England are also in the market for heavy deliveries, and the local offices are daily urged to take care of their needs. Reports from the surrounding territory are along a similar trend. Coal is short and consumers are anxious to fill their bins before the situation becomes more serious.

Stocks of the anthracite steam sizes are kept reduced by the action of the sellers in inducing retail dealers to include in their orders small tonnages of those sizes. This does not, however, obviate the necessity of the larger companies storing considerable of these coals. Most producers are sold well ahead and are not anxious to receive additional orders unless the standing order has been reduced by shipments. The local trade in some instances is said to be willing to pay premiums ranging from 50 to 75c. for quick shipments of egg and stove, while line dealers are said to have offered as high as \$1 for similar deliveries.

The steam coals are not causing so much trouble as might be expected. Shippers are not oversupplied and prices are not being cut recklessly, although they are not being kept up at full circular.

Current quotations, white ash, per gross ton at the mines and f.o.b. at tidewater at the lower ports, according to company schedule, are as follows:

	Mine	Tidewater
Broken.....	\$5.95	\$7.80
Egg.....	6.15	8.00
Stove.....	6.40	8.25
Chestnut.....	6.50	8.35
Pea.....	5.10	6.85
Buckwheat.....	3.40	5.15
Rice.....	2.75	4.50
Barley.....	2.25	4.00

Bituminous—The increasing demand has been reflected in the high grades of coal, which are becoming scarcer for the spot buyer. There is not an oversupply of the medium grade coals to be had here. The shipping strike has injured the bunker business but not seriously enough to warrant embargoes being ordered. Many foreign vessels leave this harbor daily, and shippers so far have been able to keep their stocks of bunker fuel within reason. A continuation of the strike a few days longer will have a serious effect upon conditions and may result in considerable loss to those exporters of coal who have contracts abroad.

Conditions here show a substantial improvement. Demand is on the increase and the market seems to be on the mend. The better grades of coal are hard to get, but contract coals are moving steadily. There has been a good call for the other grades and shippers report a heavy tonnage moving. Indications point to a brisk fall market, which may put the producers on their mettle to meet.

The fueling of New England is taking much attention, it being understood that there is comparatively little coal in storage. The shipments of New River and Pocahontas coals from the Southern ports are not up to normal figures and it is probable that while there is a good tonnage of central Pennsylvania coals now going into those states by rail that the operators will be asked to increase their shipments.

There has been a demand for more coal to be sent to foreign countries. Dealers have received many new inquiries but the matter of transportation is to be contended with. There has been much delay loading because of the strike, and shippers returning from Baltimore say there is considerable congestion there. Hardly any trouble is experienced in loading foreign bottoms, because the strike has not yet been extended to include the members of the British Seamen's Union. Similar conditions exist at Hampton Roads. Vessels coming to this harbor from foreign countries report much delay in coaling boats on the other side because of labor troubles, and in some instances the coaling has been done by American soldiers who are anxious to return to this country.

Locally the situation is not as active as it was a week ago. The strike has caused a slowing down in loading vessels and bunker fuels are piling up. Buying along the line is strong and quotations for coal at the mines are stronger. Shippers are receiving inquiries regarding long time deliveries, but there are very few who will take orders extending over September.

Quotations for the various pool coals here are in most cases higher than last week. They range about as follows: Pools 1 and 71, \$5.50 to \$5.75; Pool No. 9, \$5.50 to \$5.75; Pool No. 10, \$5.25 to \$5.50; Pool No. 11, \$5 to \$5.25, and Pool No. 18, \$4.35 to \$4.50.

There have been increases in mine prices on nearly all grades during the past week, as the accompanying table shows:

	Spot
South Fork (Best).....	\$2.95@3.25
Cambria (Best).....	2.95@3.10
Cambria (Ordinary).....	2.45@2.60
Clearfield (Best).....	2.95@3.10
Clearfield (Ordinary).....	2.45@2.60
Reynoldsville.....	2.50@2.75
Quemahoning.....	2.85@3.00
Somerset (Best).....	2.85@3.00
Somerset (Poor).....	2.35@2.60
Western Maryland.....	2.35@2.60
Fairmont.....	1.90@2.25
Latrobe.....	2.20@2.35
Greensburg.....	2.35@2.50
Westmoreland & in.....	2.75@2.90
Westmoreland run-of-mine.....	2.50@2.60

PHILADELPHIA

Anthracite shipments short. Dealers going along quietly. Consumers' interest lessens. Very little stove here, as well as egg. Chestnut freer, and pea easy. No domestic buckwheat demand. Interest in August prices. Coal well prepared as to quality. Buckwheat only steam size wanted. Bituminous firmer. Some stocking. Tide business good. Some prices move up.

Anthracite—The dealers in this market are in the peculiar situation of being short of their requirements, but are growing unconcerned. They all have many orders to fill and are going quietly about the work and, unlike most summers, they are actually making a profit above expenses.

The larger companies make no secret of the fact that other territories are being cared for in greater volume than the local dealers and with the tonnage which has been going to those territories, which has also been materially added to by heavy

individual shipments at increased prices, it is believed that this city's turn will soon come. New England is receiving particularly heavy consignments.

With the sizes stove continues to be the one in smallest supply, and judged by receipts recently it can be almost said there is none to be had. Most dealers' stove coal bins are bare. This is also true of egg, but a much less quantity of this is needed to fill requirements. Chestnut grows more plentiful and some dealers at times actually hint they have enough, but do not go so far as to cancel or hold orders, as they feel it might injure their standing later in the season. Even if they did hold orders no shipper would find difficulty in placing the tonnage, as many other dealers are storing all they can get.

Pea is plentiful and no one is short of this size, while most dealers actually have a good surplus of it. The position of pea in the market at this time is aptly illustrated by the advertising of the biggest producing company, which offers it for immediate delivery. It is known that the companies are being compelled to store some of this size. The individuals are having no trouble in moving their pea, as their customers simply feel obliged to take their proportion to get the wanted sizes.

One good feature of the trade is the careful preparation. Coal mined in the summer is always good and the present is no exception. The one complaint that is universal is as to the sizing. Pea is the chief offender and there is not the least hope that the operators will increase the size by eliminating more of the buckwheat. The objection to too much pea in chestnut continues, and it is really these factors that have put such a strain on stove coal these days.

In the steam trade buckwheat remains the only size that is able to muster any strength. While big tonnages are being absorbed by the trade, the call is not nearly equal to the production. Rice and barley are also extremely plentiful. The steam trade situation is clearly reflected in the vast piles of the above sizes in the storage yard at Abrams, just outside of the city, which is about three-fourths full, an unusual condition for this time of the year, but caused by the full working time at the collieries in the endeavor to get out domestic sizes.

Bituminous—There is something of a firmer feeling in bituminous lately. This has been shown particularly in the good grades, which are scarce. Customers with contracts have been asking generally for increased shipments, as this class of trade is beginning to store coal. The exception to this rule is found in that railroads and these concerns appear to have little interest in getting more than current requirements. The shippers are anxious to fill them now so that they will be in better shape to look after their other trade in the months to come. Due to heavy shipments of Pool 9 coal to New England, it has been particularly difficult to get high-grade coals on spot shipment lately.

There is an active bunkering trade at the piers and an increasing amount of foreign business offering. Particularly strong inquiries have lately come from Italy, prompted no doubt by the fact that the English Government has increased the price of British coal. There have been a few departures for Italy, but until that country is in a position to furnish its own bottoms it can hardly happen that it will get much tonnage, even though the local shippers would like to take advantage of the opportunity.

Because of the increasing demand for good coals the price tendency during the week has been slightly upward, as is shown in the appended list of prices, which are quoted f.o.b. mine:

Georges Creek Big Vein.....	\$3.00 @ \$3.10
South Fork Miller Vein.....	3.00 @ 3.10
Clearfield (ordinary).....	2.70 @ 2.80
Somerset (ordinary).....	2.60 @ 2.70
Fairmont lump.....	2.50 @ 2.60
Fairmont mine-run.....	2.35 @ 2.50
Fairmont slack.....	1.90 @ 2.05
Fairmont lump (ordinary).....	2.25 @ 2.35
Fairmont mine-run (ordinary).....	2.00 @ 2.15
Fairmont slack (ordinary).....	1.65 @ 1.75

BALTIMORE

Shipping strike interrupts but fails to halt big export business. Local market very brisk and prices on increase. Hard coal retailers need more fuel than is coming through.

Bituminous—In the midst of the largest export movement that has come to the trade since 1915, when a little less 2,000,000 tons was sent to foreign ports from Baltimore, the trade here was hit by the shipping strike. More than half the ves-

sels ready for the piers were tied up by reason of being under American registry. The foreign ships were not held up, except through delays incident to getting American vessels away from the loading points to make way for the other carriers. The export loading here would have gone far in excess of 200,000 tons for July had not the strike intervened, and even now will probably run close to that mark, as the first two weeks saw a total of 123,641 tons placed in vessels cleared for foreign ports, of which amount 107,720 tons was cargo coal and 14,921 tons bunker fuel.

The local market, too, is active and the demand is growing steadily. Just before the shipping strike the congestion of export ships was so great at the Curtis Bay pier of the B. & O. that the Canton pier of the Pennsylvania, held during the war for local and harbor trade only, was ordered open for exports. The local demand on the pier has been so heavy the past week, however, and so continues, that little of the export coal is noted at the point. The reopening of the Locust Point pier of the B. & O. for local trade or the Port Covington pier of the Western Maryland, closed for the war, or both, seems a matter of the near future.

In the growing demand for industrial coal here the prices are stiffening materially. Best coals are almost out of the market, while good grades are readily commanding from \$2.50 to \$3 mine basis to the trade. Coals that had remained idle at terminals for weeks because they were of a grade that did not attract purchasers are now finding ready sale. The poorer coals are bringing from \$2 to 2.40 to the trade. One fly in the ointment has been an embargo against coal shipments to the Curtis Bay pier, placed when the shipping strike came, and it was found that some 2,800 loaded coal cars were at the pier en route there from the sidings at Brunswick.

Anthracite—The retail trade here could use much more coal than is coming through, especially of stove and egg sizes. Many dealers are still delivering on their spring orders, as they found it impossible to get all the coal they wanted from either Company or Independent mines. At present the Independents in many cases are asking premiums running up to 60c per ton, as well as the regular monthly advance schedule, and the trade believes that these mines will be back to their war-time schedule of 75 cents premium by the fall.

Lake Markets

PITTSBURGH

Demand slightly improved. Predictions of shortage late in year are well founded. Excellent export trade. Slack prices higher.

There has been a further improvement in demand for coal and production is running at between 60 and 75 per cent. of full-time capacity. Men on payrolls are not putting in full time, but are doing somewhat better than 75 per cent.

Coal operators continue to urge consumers to lay in stocks now while there is an opportunity, stating that at best a shortage late in the fall and during the winter can scarcely be avoided. This advice has been given for a long time, but apparently coal consumers have not got rid of their early suspicions that the talk was based on nothing but a desire to bolster the market. Such a view is absolutely erroneous, as anyone can observe by noting that predictions of a shortage, with fancy prices, are made just as much by the most conservative and fairest minded operators as by those who are habitually radical in their talk.

Fancy prices for coal later in the year would not be for the good of the coal industry at all. They would be obtained only on a limited tonnage, while through influences that need not be referred to at length the cost of production would in all probability be greatly enhanced, thus causing reduced profits or actual loss upon the large tonnage of coal the operators are under contract, at flat prices, to deliver before they fill any prompt orders. The coal operators fear an insufficiency of transportation facilities even more than a shortage of labor. They have been observing of late a much larger proportion than formerly of bad order cars among the cars furnished to mines, some being in such condition that they cannot be used, and it is considered almost inconceivable that the railroads will be able to furnish full service next winter.

Demand for coal for export has improved, and for both Pittsburgh district and Connellsville coal prices well above the domestic market are being secured without difficulty. As sailing dates must be met precisely, only the large operators with efficient organizations can participate in the business.

The domestic market is somewhat stronger all around, but on mine-run and prepared sizes is hardly quotable at higher levels. Slack, however, is easily quotable 20c higher on steam and 10c higher on gas, prices being as follows: Steam slack, \$1.50 @ \$1.70; gas slack, \$1.80 @ \$2; steam mine-run, \$2.25 @ \$2.50; gas mine-run, \$2.35 @ \$2.50; 4-in. gas, \$2.60 @ \$2.75, per net ton at mine, Pittsburgh district.

TORONTO

Little anthracite coming forward; yards empty; deliveries hampered by strike of teamsters; strikes and labor unrest limit industrial demand; manufacturers not stocking up.

Market conditions are about the same as prevailed last year at this season, the dealers having orders in hand for domestic coal which they do not expect to overtake till fall. Little anthracite is coming forward and the yards are empty. Deliveries by many of the dealers are further hampered by a strike of the teamsters and a number of the yards have been closed. The prevalence of strikes in the metal trades and other industries, and the general uncertainty of the labor situation, continue to limit the demand for bituminous, which remains light. Manufacturers are not stocking up to any extent, notwithstanding the prospect of a considerable advance in prices.

Quotations for short tons are as follows:

Retail:

Anthracite, egg, stove, nut and grate.....	\$11.50
Pea.....	10.00
Bituminous steam.....	7.50
Slack.....	6.50
Domestic lump.....	10.00
Canal.....	11.50

Wholesale f.o.b. cars at destination:

Three-quarter lump.....	5.90
Slack.....	4.55

BUFFALO

Fair bituminous trade. No boom in sight. Shippers not agreed as to the outlook. Prospect of slow improvement. Anthracite rushing up the lakes.

Bituminous—The demand increases slowly. There is no boom and the effort to spring one on the part of Pittsburgh shippers has about subsided. Some members of the trade are saying that it was ill-judged and overdone. While it is usually best to be optimistic in any business, it is not easy to create business in that way.

At the same time, the trade is improving and will be in good volume by fall. The actual advance in price here has been 10 to 15 cents a ton and is enough to show that the tone of the market is good. The shippers who, for a long time, had complained of next to no orders are now reporting at least a fair volume and complaint has about ceased. They all look for a steady improvement.

It is still reported that some coal bought several months ago is to be found in consumers' hands. This is more generally the case in Canada than here, but the demand is also better in that market than it was. Good salesmen find it profitable to cover the territory. It is still common for shippers to say that business does not come in to any great extent of its own accord. It must be gone after.

Bituminous prices are rather unsteady at \$4.55 for Allegheny Valley sizes, \$4.80 for Pittsburgh and No. 8 lump, \$4.65 for same three-quarter, \$4.20 for mine run and \$3.70 for all slack, per net ton, f.o.b. Buffalo.

Anthracite—The demand is active and the supply is only moderate. Just now the surplus is going into the Lake trade, so that the local and all-rail supply is decidedly light. Injudicious publications have disturbed the consumers till they are demanding coal much as they did during the scarcest period of the war. If people were to consider the situation they would find that with no real surplus it is folly to talk of buying coal early, for the most that can be done is to transfer it from one consumer to another. The old reason for urging early buying was that there was a midsummer surplus that held up the mining. This will not be the case this year.

The local prices of anthracite are strong and steady only because the liberal premium that might be obtained is not asked even by the independent operators, for they

fear the return of the coal administration and the old restrictions. Regular prices are as follows:

	F.o.b. Cars, Gross Ton	At Curb, Net Ton
Grate.....	\$8.55	\$10.20
Egg.....	8.75	10.50
Stove.....	9.00	10.70
Chestnut.....	9.10	10.80
Pea.....	7.20	9.15
Buckwheat.....	5.70	7.75

CLEVELAND

Both labor and car shortage have contributed to a marked decrease in the receipts of bituminous coal. The lake trade has suffered likewise, and with the July Fourth holiday out, July shipments likely will show up poorly. Demand continues for all grades, with prices firm.

Bituminous—The past week has been the worst, from both the operators' and the lake shippers' standpoint, since the coal trade began showing a revival from its winter lethargy. The labor supply that a few days ago seemed fairly ample now seems distressingly short, and the holidays seem to have interrupted mine workers' ideas of a full day's work. Car supply, continually spotty, has grown worse, and on days southern and eastern Ohio mines have not had more than 20 per cent of their wants filled.

Meanwhile, factory operations in northern Ohio have continued showing a slow but consistent increase, and demand for steam coal has advanced in proportion. The shortage is by no means acute, but considerably more steam coal would be absorbed by the district were it available.

Anthracite and Pocahontas—Both grades continue extremely difficult to obtain and are in big demand by domestic consumers. Personal trips by some retailers to mining districts have failed to dislodge much additional tonnage. Anthracite prices in general have been advanced, while some have pushed Pocahontas up another notch. It is estimated that the demand for Pocahontas and anthracite now is about 15 per cent. above the summer normal, while dealers are able to get only 80 to 85 per cent. of normal supplies.

Lake Trade—Receipts of bituminous coal at Lake Erie ports for transshipment to the head of the Great Lakes continue light. Shipments from the Pittsburgh district, in particular, have fallen off. Last week the docks dumped only 864,464 tons, including 38,000 tons of vessel fuel, while in the week preceding they dumped a total of 990,000 tons. It appears that coal shipments in the last half of the season will not come anywhere near the mark set in the first half. Some of the 10,000-ton freighters must make two ports now in order to get a full cargo.

Prices of coal per net ton delivered in Cleveland are:

Anthracite:	
Egg.....	\$11.15
Chestnut.....	11.65
Grate.....	11.45
Stove.....	11.55
Pocahontas:	
Forked.....	9.50
Lump.....	8.75
Mine-run.....	7.50
Domestic Bituminous:	
West Virginia splint.....	7.75 to 8.00
No. 8 Pittsburgh.....	6.25 to 6.60
Massillon lump.....	7.50 to 7.60
Steam Coal:	
No. 6 slack.....	4.20 to 4.40
No. 8 slack.....	4.70 to 5.00
No. 8 1/2-in.....	5.40 to 5.55
Youghiogheny slack.....	4.85 to 5.15
No. 6 mine-run.....	4.50 to 4.60
No. 8 mine-run.....	4.90 to 5.05

DETROIT

Sales of bituminous, particularly the steam sizes, are still reported falling short of previous years.

Bituminous—With recollections of the troubles experienced by consumers of steam and domestic coal in the attempt to provide for their requirements in the last two winters, wholesalers and jobbers in the Detroit market are striving to guard against a repetition of these difficulties during the coming winter by urging their customers to stock up at once. Warnings of a threatened shortage in coal supply appear not to arouse the buyers to action, as jobbers say the quantity of bituminous coal now being brought into Detroit is considerably less than should be sent here to make suitable provision for the consumers.

Some of the manufacturing plants are said to be holding back because the managements want to get reserve stocks as clear as possible of the coal of inferior grade that was bought a year ago under the regime of the federal fuel administration. The car shortage situation which is reported becoming a factor in the situation in various sections which supply coal to Detroit, is causing some anxiety, in consideration of its possible relation to future supply.

Little coal is reported on tracks about town. Hocking lump is quoted on net tons at the mines at \$2.75 to \$3. Mine run from Ohio ranges around \$2, and Ohio slack is said to average about \$1.50. West Virginia gas or splint block is said to be offered at \$3 to \$3.25; mine run at about \$2.10 to \$2.20 and West Virginia slack at \$1.90 to \$2. Smokeless mine run is short in supply, with price quoted at \$2.75 to \$3.

Anthracite—Household consumers are being warned that anthracite may be difficult to obtain if orders are held back too long. With present temperatures it seems difficult to interest consumers in making provision for winter. Retail dealers have a small amount of stock on hand, which would speedily be depleted should a strong demand develop.

Lake Trade—Movement of coal to Lake loading docks is much lighter than a few weeks ago, and is being impeded by car shortage. Vessel capacity exceeds cargoes and a number of ships are obliged to wait, while some are shifted from port to port to complete loading.

COLUMBUS

A better steam trade is reported from all fields, with the domestic demand holding up well. The Lake trade is steady and a considerable tonnage is moving to the Northwest. Prices are firmer all along the line.

Producers and jobbers report a better steam demand from all sections. This is apparent in every locality and presages a better movement of steam sizes. A canvass of the situation shows that reserve stocks are fairly low and that large users must enter the market in order to replenish their stock of fuel. With iron and steel plants resuming operations, fuel requisitions are gradually increasing. General manufacturing is also improving, judging from the better demand for steam grades. Quite a few contracts have been made and prices are distinctly higher. The low priced coal of several months ago is not found to any extent as producers and shippers believe that they can get a good figure on contracts. Railroads are not using a large tonnage as yet, but they are taking more on their contracts.

The domestic trade is gradually expanding as the season advances. Retail stocks are being increased in anticipation of a rush of orders in August and September. Many of the householders have placed orders for delivery after Sept. 1 and at the market figures prevailing at that time. Some deliveries are being made, although the unsettled real estate conditions act as a deterrent. Householders are loath to stock up when they are not assured of retaining their dwelling. Retail prices are stronger and every change is toward higher levels. Pocahontas is in good demand and retails at \$7.50. Splints are also moving rapidly at \$6 to \$6.25. White Ash and Island Creek sell at \$6.50. Semi-smokeless is quoted at \$7, while Hocking lump is stronger at \$5.75.

The Lake trade is rather steady, and a considerable movement from Ohio and West Virginia mines to the Northwest is reported. Docks are in good shape as no congestion is reported. Vessels are plentiful as the grain trade has not started to any extent. On the whole, the Lake trade is moving along steadily.

CINCINNATI

Decided improvement in all branches during the past week. Volume of business increasing daily, with contract makers for yearly supplies adding to the already huge bulk of business being transacted.

Domestic users in larger numbers than for several weeks past have placed their orders for the winter supply, after having held off for several months, believing that prices would drop. The market, however, remains firm with no price advances, but many dealers look for an increase some time this fall.

Industrial users have ceased their intentions to keep buying merely for their day-to-day requirements and are placing orders for their winter supply and also for weeks ahead for present use.

The lump-coal situation continues unchanged, little business, except for the domestic users, being transacted. The demand for mine run, however, has increased.

All users are clamoring for smokeless coal, but with little prospect of getting it. The big howl is coming from the householders. Those who had placed their orders early enough now have their bunkers pretty well filled with the hard stuff, while those who waited for the come down in prices have been disappointed. All this despite the fact that thousands of dollars were spent in advertising in an effort to get these people to buy early.

LOUISVILLE

Short production of eastern Kentucky block resulting in better inquiry for western Kentucky lump. Block and lump in fair demand, with steam and mine-run draggy. Prices holding up well. Some cutting by retailers.

Retail stocking as a whole is fairly good, but would be better if retailers could secure supplies of block coal without taking steam. Operators are refusing to increase production of block, due to inability to dispose of screenings. Steam demand is slightly better, but continues quiet as a whole.

Eastern Kentucky block is a little scarce, resulting in western Kentucky operators receiving better inquiries on high-grade lump, and some business. However, conditions in western Kentucky continue dull, with the mines working about two full days a week. Prices are weak. Eastern Kentucky is working about five days. Mine prices for the eastern Kentucky section are firm. The labor situation shows no material change. The car supply situation is worrying some operators, due to the poor conditions of cars and prospects for a severe shortage this fall.

Movement by river is fair and equal to all demand for river coal from such dealers as are located on the wharves of the three falls cities. Steamboat consumption is much lower than formerly, due to smaller boats and gasoline boats being in the trade.

Quotations for the field are as follows:

	Eastern Kentucky	Western Kentucky
Block.....	\$3.50@3.75	\$2.00@2.30
Mine-run.....	2.00@2.75	1.85@2.00
Nut and stove.....	1.85@2.25	1.50@1.75
Pea and slack.....		1.35

These prices range from low grades to top prices asked by mines of all kinds throughout the fields, based on quotations made to dealers and consumers.

There is practically no Indiana coal moving into the state, or even western Louisville at the present time, due to the low prices on Kentucky coal and large offerings of spot coal.

BIRMINGHAM

Spot furnace coke easier, foundry coke stronger. Possible over production. Coal will control coke price. Market quiet, with only a moderate demand for steam fuel. Domestic continues strong, no improvement in supply being noted. Production at commercial mines confined to from one to four days per week, some few operations being idle altogether.

There is no material change in the general market situation here, the demand for steam coal being light and confined for the most part to renewal of expiring contracts and a scattering of small spot orders. During the week the Southern Ry. closed contracts for 1919-1920 requirements aggregating approximately a minimum tonnage of 700,000 with about 25 per cent. increase above these figures as a maximum. Takings were confined to Big Seam mine-run from the upper and lower benches and from the Corona seam, prices according to reports ranging from \$2.25 to \$2.60 per net ton mines. The Louisville & Nashville lines are still obtaining their supply from this district under tentative contracts since July 1. The Central of Georgia is obtaining bids on its fuel supply, contracts to date from Aug. 1. The A. E. & A. is in the market for additional tonnage, having closed contracts recently for around 150,000 tons. Quotations are based on Government prices, which were shaded in some instances in the contracts made by the Southern, due to more favorable cost conditions at some of the mines over other operations.

The domestic market is still tight, quotations ranging from \$3 to \$5.50 for lump, with no improvement in the supply.

Production for the week ended July 5, as compiled by the Alabama Coal Operators Association, totaled 187,173 tons or about 50,000 tons short of the previous like period, this loss being attributed to some extent to the holiday on the Fourth. Commercial mines are running from one to four days per week, furnace companies making a slightly better schedule.

Coke

CONNELLSVILLE

Spot furnace coke easier, foundry coke stronger. Possible overproduction. Coal will control coke price.

The spot furnace coke market has softened further, but foundry coke is stronger for both ordinary and special brands. For the past ten days there has been practically no demand for spot or prompt furnace coke. As is almost invariably the case at this time of year, the furnaces made more ample provisions than necessary against possible interruptions to shipments by reason of the holiday, and none is now in the market. Very considerable quantities of coke have accumulated on track, but as the holders have contracts and can move the coke gradually in that way it is not going to be forced on the market. A price of \$4 would readily be accepted, but this would hardly be shaded. The pre-holiday buying had put the market up to \$4.25 as minimum. Foundry coke on the other hand is stronger.

It is seriously questioned whether the operators have not overshot the mark and blown in too many ovens. There was only a slight decrease, 8000 tons, in the week in which Independence Day fell, while the following week, the first half of which witnessed Fayette County's celebration in honor of the returning soldiers, showed an increase of 27,000 tons.

The best judges of the situation are now convinced that for the remainder of this year, if not for an indefinite period, Connellsville coke will simply bring its coal value plus the actual cost of coking without fixed charges. This cost ranges from 20c. at the low-cost operations to 75c. at the highest cost operations. The formula works out exactly at present, coal being salable at \$2.35 while coke is \$4, one and a half tons of coal being required for one ton of coke. In nearly all quarters coal is expected to advance within a few months, and perhaps quite sharply. It seems likely that sliding-scale contracts made for the half year, based on pig iron prices from month to month, will not prove as advantageous to coke operators as they expected, for beyond question coal is much more likely to advance than pig iron. The market is quotable and follows: Spot and prompt furnace, \$4; spot and prompt foundry, \$4.75@5.50; contract foundry, \$5 @5.50, per net ton at ovens.

The *Courier* reports production in the Connellsville and Lower Connellsville region in the week ended July 12 at 157,838 tons, an increase of 27,048 tons.

Buffalo—The market is fairly steady, with certain domestic and steam grades a little more active. Shippers are looking for a better market before long, but cannot predict it till iron is moving more liberally. Quotations are \$7.80 for 72-hr. Connellsville foundry, \$7.10 to \$7.35 for 48-hr. furnace and \$6.20 for off grade. Crushed domestic sizes sell at \$6.60 and breeze at \$3.85 to consumers.

Middle West

GENERAL REVIEW

No change of any moment in market conditions. Screenings and mine-run still glut market.

There have not been many evidences of change in the Middle-West coal market in the past week. Lump and egg coal con-

tinue to be in great demand, and practically all of the mines are from one to three weeks behind on shipments of this size. We understand that both lump and egg coal are selling at a premium in some cases. Nut and stove sizes are not moving so well, although stove size is moving better than nut. This is because the stove size, which is 2 x 14 in. in dimension, goes to many points in Iowa, on a freight rate which is less than the freight rate from the same mine on either egg or lump coal. Screenings and mine run, as heretofore, continue a serious drag on the market, and an accumulation of these two kinds of coal at the mines is hindering production in one or two of the largest producing fields.

The expected boom, which was to come after peace was signed, has not arrived, or if it has arrived, it has not affected the coal market in the Middle-West. The big manufacturing plants and public utility plants are still maintaining a very lackadaisical attitude toward their fuel supply for the coming winter months.

There has been of late an actual car shortage at the mines in both Illinois and Indiana. This shortage, so far, has affected only the operators and the miners, as the public are not buying enough coal to notice whether or not their shipments are delayed.

CHICAGO

Strikes in many industries has had effect on coal market conditions. Eastern coal preferred by retailers.

Chicago operators and jobbers are certainly on their toes these days, as the steam coal situation in Chicago has been very discouraging. Conditions may be even worse now, with the strike in progress at the plant of the Corn Products Co., as well as at the International Harvester plants. Both of these concerns use considerable quantities of coal, and producers of this coal are now forced to look elsewhere for a market, adding another burden to a market already weakened to a point of collapse. It is further remembered that labor troubles are brewing at the Union stockyards. The various packing companies at this plant consume more screenings and fine coal than any other Chicago industry. If these people are forced to close their plants, on account of strikes, it will mean a tremendous tonnage of screenings thrown on the market. It is hoped that the packers will continue in operation, because if their plants are closed down it will result in a calamity to the Chicago steam coal trade which will be far-reaching in its effect.

The Chicago domestic market has been a little hard up on business for the mines in Illinois and Indiana. This is easily explained by the fact that the retailers are finding it almost impossible to obtain labor to unload the coal as it arrives. Furthermore, they feel that if they are to have any eastern coal at all, now is the time to get it. They are everywhere giving this business preference over coal from Illinois and Indiana.

MILWAUKEE

Coal market slow and dock yards in danger of becoming stocked up too early. Shortage of stove and nut anthracite.

The outstanding feature of the Milwaukee coal market is a shortage of stove and nut sizes of anthracite. Notwithstanding the total receipts of anthracite thus far this season exceeds that of last year by nearly 75,000 tons, the amount of the two sizes named that has been available for delivery up to the present time is fully 20 per cent. less than requirements call for. Egg and pea anthracite are plentiful.

The demand for coal is not what it should be in the face of published warnings of a probable shortage in the fuel supply when the cold season arrives, and there is danger that the receiving yards will become choked up long before the Lake season ends and thus force a check on receipts. Receipts thus far since the opening of navigation foot up to 271,879 tons of anthracite and 1,426,457 tons of soft coal, a gain over last year of 74,046 tons of the former and 310,003 tons of the latter. The byproduct plants are making every effort to market coke, but stock piles are steadily increasing.

ST. LOUIS

Unusual shortage of high-grade domestic coals. Oversupply of steam sizes. Conditions show improvement in Mount Olive and Standard fields. Car shortage severe in places. Coal shortage more apparent daily.

The local domestic situation shows considerable improvement. The tendency seems to be entirely for Carterville, and all retailers are sold up for thirty days on this coal. Orders for anthracite and smokeless are also good. There is, however, little anthracite, and no smokeless is coming in.

The Carterville situation is most serious. Some mines are sold up on the lump size for the month of August and are taking only a limited quantity of lump business for September. Practically all mines are sold up in the Carterville district for July, and more than half are not taking orders for August delivery. The egg size seems a little easier, but mines are sold ahead on that. Nut is troublesome and screenings have blocked everything out. This is causing the local dealers to push the other grades of coal, preferably Mount Olive. The situation in the Carterville field is a peculiar one. The mines have worked but two or three days a week, and the days that they decide to run the railroads fail to deliver equipment. The car shortage is beginning to be severely felt.

Similar conditions prevail in the Du Quoin field. A better tonnage of this coal is coming into the St. Louis market than has moved in here in over three years. The railroad fuel tonnage out of both of these fields has shown considerable improvement the past week.

The Mt. Olive situation is normal. Steam sizes bother the operators some, but it is not so serious in this field as in others. A better tonnage of this coal is moving to the St. Louis market, but the steam tonnage and a large portion of the domestic tonnage is moving north and northwest, with a fairly good steam tonnage to Kansas City.

The Standard field presents the same old difficulty, that of not having a market for anything, although the demand for domestic sizes appears to be just a little better than last week. This means that the condition of the steam market is serious, and screenings got down to as low as \$1.10. The country business on domestic sizes shows considerable improvement, but in a general way the Standard field has not as yet begun to come into its own.

A careful survey of the entire situation presents the fact that there is going to be a serious coal shortage in the St. Louis district on the higher grade coals.

The local haulers association contemplates asking 25c. a ton more for hauling, and there is considerable feeling over this on the part of the dealers who have their hauling done, because they feel that coal prices ought to be increased accordingly. Dealers who own their own equipment, however, do not think the price of coal should be advanced. It appears like a freeze-out for the dealers who haven't their own teams.

Coal and Coke Securities

New York Stock Exchange Closing Quotations July 21, 1919

STOCKS		BID		BONDS		BID	
Ticker	Abvn.		Asked				Asked
American Coal Co. of Allegheny.....	(ACL)	45	....	Cahaba Coal, 1st Gtd. 6s, 1922.....		97	....
Burns Brothers, Com.....	(BB)	150	154	Clearfield Bituminous Coal, 1st 4s, Ser. A, 1940.....		75½	....
Burns Brothers, Pfd.....	(BB)	110	115	Colorado Fuel & Iron, Gen. 5s, 1943.....		90½	92
Central Coal & Coke, Com.....	(CK)	55	....	Colorado Indus. 1st Mtg. & Col. Tr. 5s, 1934.....		76½	78
Central Coal & Coke, Pfd.....	(CK)	63	....	Consolidation Coal of Maryland, 1st Ref. 5s, 1950.....		87	88
Colorado Fuel & Iron, Com.....	(CF)	49½	51	Jefferson & Clearfield Coal & Iron, Sec. Mort. 5s, 1926.....		96	....
Colorado Fuel & Iron, Pfd.....	(CF)	105	125	Lehigh Valley Coal, 1st Gtd. 5s, 1933.....		99½	101
Consolidation Coal of Maryland.....	(CGM)	75	....	Lehigh Valley Coal, Gtd. Int. Red. to 4%, 1913.....		79½	....
Elk Horn Coal, Com.....	(EH)	38	39½	Lehigh Val. Coal & Nav. Con. S. F. 4½s, Ser. A, 1954.....		90	....
Elk Horn Coal, Pfd.....	(EH)	..	47½	Pleasant Valley Coal, 1st S. F., 5s, 1928.....		80½	....
Island Creek Coal, Com.....	(ICR)	39	....	Pochontas Coal & Coke, Joint 4s, 1941.....		83½	....
Island Creek Coal, Pfd.....	(ICR)	75	....	Pocahontas Con. Collieries, 1st S. F. 5s, 1957.....		84½	87
Jefferson & Clearfield Coal & Iron, Pfd.....	(JF)	63	....	Roch. & Pitts. Coal & Ir. Helvetia Pur. Money 5s, 1946.....		98	....
New Central Coal of West Va.....	(NCC)	5	....	St. L. Rocky Mnt. & Pac. Stamped 5s, 1955.....		..	80½
Pittsburgh Coal, Com.....	(PC)	67½	68	Tenn. Coal, Iron & R.R., Gen. 5s, 1951.....		90½	93
Pittsburgh Coal, Pfd.....	(PC)	94	97	Utah Fuel, 1st Sinking Fund 5s, 1931.....		87	....
Pond Creek Coal.....	(PD)	19	19½	Victor Fuel, 1st Mtg. Sinking Fund 5s, 1953.....		55	70
Virginia Iron, Coal & Coke.....	(VK)	64	68	Virginia Iron, Coal & Coke 1st 5s, 1949.....		85½	85½